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ABSTRACT

This is an interim report of the longitudinal research presently being conducted by the staff of the Management Implications of Team Teaching (MITT) Project. The MITT Project examines a fundamental change in the organization of the instructional staff of the American elementary school generally referred to as team teaching or team organization. Such a reorganization could have profound implications for the locus of control over educational decisions, the structure of social relations of the faculty, the sense of fulfillment in work of individuals, and other "side-effects" of great significance to school administration. The MITT Project consists of two rather distinct investigations. The "prime" study is to verify particular findings from previous research that have been characterized as consequences of team organization. The "companion" study examines the considerations that make it more or less likely that a school, once committed to reorganization, will succeed in its implementation efforts. Chapters report on the selection of the subject schools, the development of measures, the preliminary findings, and the predicting of task interdependence of teachers. Appendixes contain questionnaires, tables, and reports of measures and findings. (Author/IRT)

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Management Implications of Team Teaching

GOVERNANCE AND TASK INTERDEPENDENCE IN SCHOOLS: FIRST REPORT OF A LONGITUDINAL STUDY

Project MITT

by

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Preface

Most research in education is cross-sectional and reports are issued after the conclusion of data collection. We are engaged in a longitudinal research project and find ourselves in a position to report on some elements of our project well before the last set of data is in hand.

This report is the first technical report of Project MITT. Its focus is on the front end of the Project, including the initial formulation of the research, details of instruments developed to secure the data, and early analyses of data obtained in the first of five semi-annual waves of data collection.

Our overarching goal has been to inform reliably educational policy decisions pertaining to the governance and instruction of the elementary school. Our research procedures, we believe, put us in position to draw sound inferences to form an important basis for policy decisions. While we are far from this goal, even this first report challenges some fondly embraced images of the elementary school.

As could be expected, many people get caught up in a longitudinal research project of this magnitude. The report does not begin to suggest the important contributions of nearly 50 persons who have had a direct hand in different aspects of the research process, or the nearly 700 teachers and administrators who have served as research "subjects," often willingly, but also with understandable misgivings.

While the project is indebted and obligated to each of these persons, there are a few prime actors who deserve special mention. The research design in the fullest and most complete sense of that term is the special product of

W. W. "Sandy" Charters, Jr. Major work on instrumentation, but especially clarity of thought and expression are the significant contributions of Richard Carlson. Richard Moser carried the extraordinary responsibility of lining up the research sites. He accomplished this not only at a level which exceeded our best hopes, but also with style and flair. It was left to John Packard to merge these various talents. He also contributed heavily with Charters and Carlson to the refinement of the research design.

Tom Jovick, Robyn Milich, Bill Jones, John DeFlaminis, Paul Mawter, and Ken Beirly each made many various and important contributions as graduate assistants. Jovick, Milich and Jones were especially instrumental in preparation of data for this report. Karen Amsden and Lisa Henn have made vital contributions as well, through their typing and secretarial skills. Spencer Ward and Fritz Mulhauser from NIE figured prominently in the conduct of the project and have long served as friendly critics who sharpen our thinking and keep us on our course. Pat Schmuck and Sue Paddock have recently joined our staff. It is their responsibility to translate ideas that the researchers record in technical reports, such as this one, into forms and expressions that are relevant to practicing educators.

John S. Packard

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CHAPTER I

Governance & Task Interdependence: The Research Project

Background and Overview

This is an interim report of the longitudinal research presently being conducted by the staff of the Management Implications of Team Teaching (MITT) Project, Center for Educational Policy and Management, at the University of Oregon. The project was formally initiated in December, 1972, under contract with the National Institute of Education, U. S. Department of Health, Education, and Welfare, and a detailed prospectus of the research was issued in September, 1973[1]. By late April, 1974, data-taking procedures had been developed and field tested, logistical problems of large-scale research resolved, and some thirty-eight elementary schools in sixteen school districts selected for participation in the project. At that point, the first wave of data was obtained from the schools. A second round of data was collected in November, 1974, and at this writing (Fall, 1975) data for the fourth wave are being elicited from staff members of the participating schools.

Purpose of the Interim Report

While conclusions of a field experiment designed to span at least three years cannot be drawn in advance, we are, nevertheless, currently in a position to report on a number of matters of significance to the educational research and development community.

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[1]John S. Packard, Richard O. Carlson, W. W. Charters, Jr., and Richard H. Moser, Management Implications of Team Teaching: Prospectus for Research, Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1973.

The research prospectus that set out the rationale for the MITT Project was a working document prepared for the National Institute of Education and received little circulation beyond the confines of the N. I. E. and its panels of project reviewers. We intend the interim report to carry a description of the project--its justification, the hypotheses and arguments under examination, and the design of the research, to a wider audience in a format less constrained than the prospectus.

In addition, we are able to report on the extensive conceptual and empirical work that has gone into the development of measures of certain key variables in the study. This work has represented a subset of research projects in their own right. Our methodological investigations are now mostly finished, and they will furnish an essential technical base for our eventual data analyses and inferences leading to the study's conclusions. We believe, however, that the results of the conceptual and methodological analyses have general value to research on school organization and deserve to be reported well in advance of our "final report."

It is also possible to describe in some detail the teachers, schools, and school districts on which the eventual hypothesis tests and general conclusions must, perforce, rest. These have now been chosen. How and when they were selected, how they were induced to cooperate and continue cooperating in the provision of information, what they turned out to be like when examined more closely, what has happened to them in the first year of participation in the MITT study--all are

matters that limit the study. The vagaries of a natural experiment are such that the researchers' initial visions and assumptions about the "subjects" of the study do not correspond in a one-to-one fashion with reality as it naturally unfolds, and it is important to hold up for comparison assumptions and facts.

It will become apparent in the course of this report that certain of the hypotheses of the MITT Project can be informed, even provisionally tested, by data taken in the early rounds of collection. With a few exceptions, the relevant analyses have been completed, and sections of the interim report are organized around the presentation of the results.

The Two Studies of MITT

The MITT Project examines a fundamental change in the organization of the instructional staff of the American elementary school generally referred to as team teaching or team organization, a plan according to which the school's instructional program would be planned and carried out by small, closely-knit work groups of faculty personnel rather than by individual teachers atomistically dispersed in their separate classrooms. While the plan's rationale ordinarily rests on its efficacy for student learning, theoretical reasoning as well as empirical evidence suggests that such a reorganization could have profound implications for the locus of control over educational decisions, the structure of social relations of the faculty, the sense of fulfillment in work of individuals, and other "side-effects" of great significance to school administration.

The MITT Project consists of two rather distinct investigations that we have come to call the "prime study" and the "companion study." These phrases reflect the historical emergence of the two in the course of the Project planning and the priority we have given them in guiding our empirical work. Although both studies draw on the same source of data, they differ in the nature of the inferences we seek to draw from the data.

The central point of the *prime study* is to verify, through a longitudinal design, particular findings from previous research that have been characterized as *consequences* of team organization of elementary schools; in the logic of this study, the staff organization stands as the independent variable--the cause of the (presumably) ensuing consequences.

The *companion study* turns the tables: staff organization becomes the dependent variable. We seek to understand the considerations that make it more or less likely that a school, once committed to reorganization, will succeed in its implementation efforts. In the logic of the companion study the focus shifts to the *antecedents* of team organization.

It must be said that the intellectual and empirical traditions undergirding the two types of investigation also tend to be distinct, one drawing on the sociology of complex organizations and the other on the literature of the diffusion and adoption of innovations. The two traditions rarely are brought to confront one another, and it is not the MITT Project's central intent to do so. But let us describe the

genesis of the MITT research and provide an overview of the problems under investigation.

Instigation to research. The impetus for research came from two major investigations into the effects of instructional staff organization in elementary schools that had reached remarkably similar conclusions, one conducted at the University of Oregon's Research and Development Center (Center for Advanced Study in Educational Administration) and the other at Stanford University's Center for Research and Development on Teaching.[2] The findings were all the more remarkable because the studies were conducted independently of one another.

These investigations pointed to potentially profound consequences that would likely ensue from the institution of teaching teams in the elementary school, including a shift of power over the design and operation of the educational program from the administrative hierarchy to the teaching faculty, a reduction in the isolation of the individual teacher from the teaching ideas, problems, and activities of his colleagues, and increase in the teachers' feelings of control of work and satisfactions derived from their occupation and job. The findings were eminently reasonable from a theoretical point of view of the sociology of complex organizations and were certainly in accord with the arguments of the day lauding the Multi-unit School, open education, and similar

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[2]The principal sources for the Oregon research are the several publications by Roland J. Pellegrin (1970a, 1970b, Klausmeier and Pellegrin, 1971) and for the Stanford research the technical report by John Meyer and Elizabeth Cohen (1971) and a dissertation by Brunetti (1970).

reforms; moreover, they were generally supportive of the power equalization ideology prominent in educational administration and other fields of organizational management.

In both studies a group of schools was selected for their accord with a particular criterion--for schools representing the Multi-unit School model in the Oregon investigation, eight open-space, team-organized schools in the Stanford study--for contrast with a similar number of conventional schools, and measures were then taken by questionnaire and interview to measure the relevant staff attributes. Despite differences in the way variables were measured, comparisons of the two investigations showed teachers in the "experimental" schools to score higher than their counterparts in conventional schools in these specific ways:

1. the extent of their task-oriented interaction (communication) with fellow teachers,
2. the degree of interdependence among teachers in their work relations,
3. the extent to which control over instructional and curricular issues rested in collegial groups of teachers rather than principals and extra-school supervisors,
4. the extent to which teachers were influential in decisions concerning school-wide matters,
5. the amount of autonomy teachers believed they had in their work,

6. the level of satisfaction teachers expressed regarding their work and their occupation.

While a number of other contrasts were reported in the separate studies, these were the ones that most closely parallelled each other.

As persuasive as the findings were from the two independent studies, they left several important issues essentially unsettled or as matters of conjecture. Both investigations were avowedly exploratory and the authors offered their findings as tentative conclusions only, inviting other researchers to confirm and extend them. It was the contention of Project MITT associates that findings holding the potential import of these deserve careful scrutiny and confirmation, especially as they carry the implied authority of work from major research and development centers. They warrant further investigation not only to affirm their generalizability but to answer the unsettled questions that are of central importance to makers of educational policy on the national or local scene.

There were four outstanding questions unresolved by the pioneering investigations of Pellegrin and the Stanford group. The first two arise from the inherent limitations of the comparative, or cross-sectional, research design used in both studies, while the second two derive from measures used (or not used) by the investigators.

1. Were the "effects" possibly antecedent to team organization? In a comparative research design, it is purely a matter of conjecture that alterations in the school's organization were antecedent to, and the cause of, the variables that were measured among the staffs and proclaimed as "effects." An equally plausible interpretation of exactly the same find-

ings is that staffs of the Multi-unit or open-space schools already had these measured attributes and that it was because of their pre-existence that the schools were able to move successfully to a different organizational form. Thus, one might well expect schools with satisfied and committed staffs exercising control over educational policy and in communication with one another about their teaching work to be more promising sites for introducing an innovative organizational plan than schools whose staffs lacked such attributes. Cross-sectional research does not allow the separation of the alternative interpretations, but the alternatives obviously convey fundamentally different messages to the educational policy maker.

2. Were outside factors (quite apart from team organization) possibly responsible for the effects? Another possibility that comparative studies cannot easily rule out is that the differences in staff attributes were due to outside factors accidentally or systematically associated with the criteria of selection. For example, it is possible that the "experimental" schools, in contrast to their "controls," were well endowed with paraprofessionals or other support personnel who relieved teachers of the more onerous chores of their work or made special resources available in the way of curriculum materials, instructional equipment, and outside consultants--conditions that could well generate a sense of well-being among the staff members. As investigators selected schools for comparison, they may have inadvertently chosen schools differing in the supportiveness of the principal, in the strength of the teachers' organization, in the age and enthusiasm of

teachers, or in still other ways, any one of which might have produced the differences measured between the two types of school.

Given the subjective character of most of the measures used in the two studies, it is also possible that the differences were the product of something like a "Hawthorne effect." Meyer and Cohen as well as Pellegrin drew attention to its possible operation and adduced anecdotal evidence to emphasize the dangers it posed to interpretation. Teachers may well have been effected by their participation in a novel educational setting, a setting in which the "shackles of tradition" were being challenged and which brought to the participants acclaim and professional status. The involvement of teachers and their principal in a major change project could certainly affect work-related communication and serve to equalize authority relations. Such involvement would also enhance job satisfaction quite independently of the particular nature of the change at stake. The Hawthorne-effect interpretation of the studies' findings is especially important to assess, since it implies that the observed consequences are transient ones and likely to disappear once the setting's novelty had worn off.

3. The "treatment" variable--instructional organization or managerial organization? Even were the foregoing possibilities inoperative, there is uncertainty in the investigations as to precisely the difference between experimental and control schools that were responsible for the differences in attributes of the staffs. In particular, it is unclear whether the effective variation resided in the manner in which the school instructional program was organized and carried out or whether it resided in the formal management structure of the schools. As used in

professional publications and the ordinary parlance of school practitioners, the phrase "team organization" (as well as its various transpositions, "teaming," "team teaching," "teaching team") refers indiscrimately to either meaning.

On the one hand, "team organization" may refer to a formal arrangement in which classroom teachers are assigned to units of the school (not unlike departments in the high school) consisting of teachers at the same or adjacent grade levels and headed by a leader. Units meet more or less regularly, and through them certain managerial and even policy-making functions are performed. In the elementary school such units are often called "teams," their leaders "team leaders." Multi-unit schools, such as Pellegrin studied, are explicitly organized in this fashion. In contrast, conventional schools rarely have units intervening between the level of the individual teacher and the principal's office; the school itself is the smallest managerial unit of the system.

The same terms, on the other hand, are also used to denote a particular organization of the school's work system in which sets of teachers (and not necessarily all teachers) have abandoned their traditional independent modes of teaching--each in his or her own classroom with his or her own pupils throughout the year--in favor of the joint instruction of a common group of pupils.[3] The traditional instructional organization is

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[3]Elsewhere in the report we note further inconsistencies in usage, even when the reference is restricted to the form of the instructional organization.

often called the "self-contained classroom" pattern.

The experimental schools of both the Pellegrin and the Meyer and Cohen studies clearly had "team organization" in common, in the sense of reorganized managerial systems. Pellegrin's Multi-unit schools obviously had this attribute, since the distinguishing characteristic of the model is just what the name implies. (The model also provides for a faculty council, composed of unit leaders and the principal, concerned with program policy and coordination in the school; it is called the Instructional Improvement Committee, or IIC.) The Stanford group used the following criteria for choosing their comparison schools:

> Open schools: Schools in which teachers are organized into formal work teams to plan cooperatively and to conduct instructional tasks in open instructional areas where teaching situations are not separated by floor to ceiling partitions.
>
> Self-contained schools: Schools in which teachers are formally organized to carry out instructional tasks individually and separately in self-contained classrooms.

The existence of "formal work teams" almost certainly alludes to the assignment of teachers to formal units rather than the actual organization and operation of the instructional program.

Since neither study included direct measures of instructional organization, one is uncertain of the extent to which the experimental schools were commonly characterized by joint instruction of pupils or even that they differed from the controls in this regard[4].

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[4]Pellegrin sought to measure work interdependencies among teachers by means of a questionnaire item. The measure was suggestive but not definitive regarding the pattern of instructional organization. (See Charters, 1973, p. 51.) If responses to the item can be taken as depicting joint, collaborative instruction of pupils, his evidence indicates that many Multi-unit teachers were not caught up in such a work system.

In fact, scattered evidence in the study reports, anecdotal and otherwise, suggests that many teachers in the experimental schools continued to operate their instructional programs in the standard independent pattern. Even the architectural criterion did not stand still for the Stanford group. They noted an inclination among teachers who worked in an open-space habitat to partition off areas for themselves and their students with bookcases, storage files, and the like to protect the sanctity of their individual classes (Meyer and Cohen, 1971, p. 22).[5]

It is of significance to learn whether the consequences reported in the studies were consequences of alterations in the managerial system or work system of the schools. Ordinarily a new managerial structure can be established readily by administrative fiat, unlike the creation of collaborative, joint teaching relations among sets of teachers, which depends heavily on voluntary behavior of the teachers themselves. Certainly the strategies for changing the one are not identical to those for changing the other.

4. Were the effects more than the collective impressions of teachers? The conclusions reached by both the Oregon and Stanford investigators were based almost exclusively on teacher responses to questionnaire items which were then averaged over all teachers in a school or class of schools. This procedure is especially problemmatic with respect to

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[5]Open-space architecture was not common to both sets of experimental schools. Indeed, Pellegrin observed the most profound shifts in faculty power and other measured attributes in one of the older Multi-unit schools built in the standard "egg-crate" design.

measuring such attributes as power and influence relations, the locus of decision making and control, or teacher autonomy, inasmuch as teachers are not always and uniformly in a position to report accurately on the matters and are likely to color their reports by personal preferences, values, or general levels of satisfaction. This, of course, is not unique to teachers; it is generally acceded in social research that descriptions of situations, especially where they entail judgments, are as likely to tap the general affective states of the respondents as they are to reflect veridical characteristics of the situation described.

To the degree the confounding of subjective feeling and objective fact occurred in the measures of the studies, a number of the conclusions would be in doubt. If, for example, the affective states of teachers in the experimental schools were more positive than in the control schools, perhaps for reasons suggested under our second question, above, one might also expect that the differences in their descriptions of collegial power, autonomy, and the like were due as much to their "euphoria" as to literal changes in the organizational control structure.

There were more paradoxes and questions in the findings than the four we have mentioned, some of which will be discussed in Chapter IV, but they were the main ones that led the MITT associates to seek more definitive evidence on the consequences of "team organization" than the pioneering investigations allowed.

The "prime study." Definitive evidence could only come from longitudinal investigation--a study in which staff attributes could be measured before the introduction of a "team organization" and, in the

same schools, sometime after (or several times after) the introduction. The plan for such an investigation, using carefully devised measures to settle the questions outlined above, became the "prime study" of the MITT Project.

The plan developed by the MITT staff called for identifying some 20 elementary schools, conventional in managerial structure (*i.e.*, no formal work units), that had a high probability of moving into a unitized structure in the near future and obtaining relevant measures of staff attributes while they were still in their conventional form. The plan also called for selecting another 20 conventional schools, preferably in the same school districts, that were unlikely to shift to the unit structure in which parallel measures could be taken at the same time intervals, envisioned as every six months for at least three years. In the interim, some of the first set of schools, if not all, would in fact form managerial units and become, for purposes of the research design, *bona fide* experimental schools. Those that did not change, including those among the additional 20, would become *bona fide* controls. It would be necessary, of course, to monitor all schools carefully to determine the point in time when reorganization occurs and to certify that reorganization does not occur unexpectedly in the control schools.

By this plan no effort would be made to select schools on the basis of the instructional organization prevailing in them; that is, we would not limit our selection by certifying that all teachers were operating their classrooms in the conventional, self-contained pattern. Rather, this would be a measured variable. We had two reasons for

following this plan. First, our previous observations had indicated that pairs or trios of teachers can be found even in schools proclaimed as highly conventional who have entered into collaborative teaching relationships on a more or less informal basis, often without dignifying the endeavor with the term "team teaching." We did not know how general this was across elementary schools, but if it were quite common, we would severely restrict the number of schools qualifying for the study. Second, identifying forms of instructional organization prevailing in a school is a major investigative task in its own right, so it would be prohibitively expensive to survey a large number of schools in this respect as a screening procedure.

The before-after design planned for the study resolves the problem of establishing the direction of causation between reorganization (managerial or instructional) and attributes of the school staff. Moreover, the design makes it difficult to argue that outside factors accidentally or systematically associated with the treatment variable, rather than the treatment itself, gives rise to changes in staff attributes, unless the outside factors happen to change concomitantly with the reorganization. As discussed shortly, the use of control schools would help detect and eliminate from consideration influences of such extra-school forces.

Success of the plan hinged on our being able to locate schools with a sufficiently high probability of moving from a conventional to a unitized mode of staff organization during the few years covered by the research to make it worth the costs of collecting "before" data. It was

apparent that the base probability of such reorganization in the general population of elementary schools was exceedingly low, so were we to choose an unselected, or random, sample of schools, only a tiny fraction would likely reorganize during the period of observation. Research costs would be exorbitant. The strategy finally adopted by MITT to raise the probability to an acceptable level was to choose schools that had made what we have called an *institutional commitment* to reorganization sometime during the winter or spring of a given year (1974, as it turned out) but which did not intend to *implement* the reorganization until the following fall.

Institutional commitment in our usage is akin to what some writers on educational innovation refer to as the "decision to adopt." It is a political decision taken in the school system--a statement of intent--and does not necessarily alter the operating form of the school's instructional program or managerial structure immediately. Indeed, previous research by the MITT Project associates as well as by other students of educational innovation had pointed to the possibility of long delays between the commitment decision and the first alterations in the operation of schools; *i.e.*, the beginning of implementation, including several instances in substantive changes never did eventuate. Although we recognized that institutional commitment carries a force of its own (Smith and Keith, 1971, Chapter 2), our intention was to obtain the "before" wave of data as soon as possible after the decision had been taken and while the school's work and managerial systems still reflected the mode prevailing during the current school year.

The "companion study." As the plan for the "prime study" began to unfold, it became obvious to MITT associates that a good bit of firm evidence would be on hand regarding the timing of implementation events. The commitment decision would be pin-pointed in 20 or so elementary schools, and each school would be closely monitored with respect to the time at which changes in both the managerial structural and the instructional organization occurred, if they occurred at all. In effect, we would have an unequivocal dependent for a study of organizational change, a variable that investigators of educational innovation obtain only through case studies of individual schools or through reliances on participants' after-the-fact recall. Moreover, since we would be on the scene in advance of any work system changes (although not the institutional commitment to change), we would be in a position to assemble information relevant to propositions concerning antecedents of organizational change or implementation success. Again, direct measures of pre-existing conditions in as many as 20 schools is a rarity in research on the implementation process. While the formulation of this type of investigation would require a shift and broadening of perspective, the MITT staff believed it would be negligent not to capitalize on this unique opportunity, and our efforts to do so became the "companion study."

As we initially stated it, the central question of the study was this. Given that an elementary school has made a formal commitment to adopt a "teaching-team" plan, what conditions affect the rate at which implementation occurs? The MITT staff's interest in the question grew out of a long-standing concern with the adoption of innovations

(Carlson, 1965; Carlson, *et al.*, 1965) and more recently with the implementation of differentiated staffing (Charters, *et al.*, 1973). These studies and other work (Gross, Bernstein, and Giacquinta, 1971; Smith and Keith, 1971) had pointed to the cruciality of the implementation period in determining whether or not intentions to change would eventuate in actual change. It was clear that substantial slippage often occurred in schools following expressions of intention to adopt an innovation, and researchers had begun to identify sets of conditions that influenced the speed and success of implementation.

The MITT staff recognized that a study of the implementation process would have to be restricted in scope, lest it become a major study in its own right rather than a "companion." The staff associates knew the enormity of effort in conducting longitudinal case studies in just a few schools for a brief time, and we did not want to try the same in 20 schools for three or four years while, at the same time, conducting the prime study. We did not have the manpower resources for it.

Our resolution was to restrict attention to those determinants (or presumed determinants) of implementation success that could be measured prior to the start of efforts to alter the school's on-going instructional program or staff organization, *i.e.*, during the pre-implementation period. We would not attempt to take into account, or collect systematic evidence on, events and conditions affecting implementation success that occurred in the course of implementation efforts. It is suspected, for example, that success in establishing an innovation in schools is contingent on the continuing stability of the leadership

personnel who initiated the idea and give it thrust, but the departure of the school's principal at the end of the first year of implementation would fall outside of the set of determinants encompassed by our scheme. The restriction meant, in effect, that independent variables of the study would be measured only in the first wave of data-taking, shortly after the commitment decision had been made in the schools, and between then and the opening of school in the fall, if that was the point at which programmatic changes were to begin. Thus, we approached the study as a true prediction problem, taking measures on a number of antecedent organizational variables and events and assessing their capacity to predict the rate and degree of subsequent change in the school's work system.

The criterion variable, in this plan, would be in the realm of the instructional organization, specifically changes toward collaborative, joint teaching among sets of teachers. We formulated this as increased levels of task interdependence in the school's work system. We regarded the creation of new management structures as non-problemmatic in this context, recognizing that they are readily installed and disassembled by administrative decree. The emergence of interdependencies in the work performance of teachers, however, is a more significant issue of organizational change in the school and certainly more problemmatic.

Chapter V of this report describes in detail our formulation of the prediction problem. It also describes the status of the 16 elementary schools (as the number turned out to be) with respect to the attributes and conditions presumed to predict the degree and rate of

achieving change in instructional organization. The predictive capacity of these variables, of course, will not be known until later on in the project when the extent and rate of implementation can be determined.

CHAPTER II

Preparation for Research: Selection of Schools

A basic prerequisite of Project MITT was the identification of some 20 elementary schools that had a high probability of moving from a conventional organizational form to a unitized managerial structure in the fall of 1974. It was obvious that a random sample of schools would not do and that we would have to select schools which had made a commitment to an innovative program in elementary education whose goals of reform included the changes we needed to observe.

Preliminary explorations revealed that the Individually Guided Education (IGE) movement, supported by federal funds and by the Sears and the Kettering Foundations, not only sought to promote teaching teams (in both the managerial and instructional organization senses) among elementary schools but also was poised to initiate a substantial number of start-ups at the beginning of the 1974 school year. Educational changes promulgated by the IGE movement go well beyond multi-unit organization, and we debated the wisdom of limiting the MITT research to a particular innovative program. The IGE literature lists six components besides multi-unit structure as comprising the IGE system: a model of instructional programming; curriculum materials; a model for measurement and evaluation; a program of home-school-community relations; a local, state, and national system of facilitative environments; and a continuing research and development program at the school, regional, and center levels.

Thus, we recognized that schools adopting IGE would likely be

engaged in a number of specific reforms in addition to changes in staff organization, but the hazards this posed to the MITT study and the inferences that could be drawn from it were minimized by two facts. First, IGE was not "all of one piece" in practice. The goals promoted by the agents and agencies supplying consultative aid to the schools were highly variant, sometimes emphasizing only a few of the components and ignoring the rest and sometimes replacing the IGE goals and procedures with others from other sources. The schools, similarly, could pick and choose among the components or develop reforms of their own. Second, some of the schools we eventually recruited to the MITT study were not under IGE auspices, did not have access to the curricular or other materials from the Wisconsin R & D Center, and, in some cases, were unaware of the IGE movement.

The Project plan also called for recruiting 20 additional schools to serve as controls, schools that had a conventional managerial structure at the outset and were likely to remain conventional for the duration of the study. The threats to inference we sought to control by this plan were the usual ones of a before-after design, especially the extra-school forces at play between the first and last measures whose effects on the variables of interest (communication patterns, control structure, and teacher's affective responses to their work situation) might mistakenly be attributed to alterations in the managerial structure or instructional organization. We could depend on little more that speculation regarding the nature or strength of such extra-school forces, but the reasonable ones seemed to be those that emanated

either from within the school district itself (*e.g.*, the emergence of a militant teachers' organization or the appointment of a superintendent with a different administrative philosophy than his predecessor), from within the state (*e.g.*, pervasive changes in the social or economic climate affecting teachers' sense of well-being). Thus we attempted to pair the innovative schools with at least one control school from the same school district and, thereby, from the same state.

Beyond the demand for experimental and control schools, 16 schools included in the sample should reflect a 1-6 grade distribution of students, and a minimum of 8-10 grade-level teachers for 200-300 students to a maximum of 25-30 grade-level teachers for 500-700 students. A full-time principal should be assigned to each school building in the sample. And finally, schools should vary on the degree of urbanity in the attendance area, the number of specialists assigned to the school, the amount of administrative support, architectural features of the building and a variety of regional, district, staff and student characteristics.

Search and Recruitment

The search for schools began by locating the likely population of potential experimental schools, *i.e.*, all schools that had committed or were most likely to commit themselves to IGE implementation beginning in the fall of 1974. In November of 1973, 27 states had at least one IGE elementary school in operation and plans for expansion. Twelve of the 27 states had implemented a significant number of IGE schools and there-

fore had instituted leagues, formed a state network, and identified a state coordinator. All 27 states, particularly the 12 most advanced, served as the initial target population for site location/selection in Project MITT.

The initial contact with the field was in November 1973 at the Annual Convention for Individually Guided Education where an overview of our plans for Project MITT was presented, and primary contacts were developed that would serve as important linkages into the field.

Succeeding contacts were made with state coordinators interested in and willing to accommodate MITT's search for schools. Many coordinators were extremely cooperative, perceiving, perhaps, some benefit for themselves if schools in their states were to participate in MITT. State coordinators in turn invited us, or willingly accepted our request, to attend follow-up conferences in the state or region. The facilitator's purpose for these conferences was to provide an overview of IGE to interested principals and staff members from local schools. In 12 conferences we made a formal presentation, on the purposes of Project MITT, and the costs and benefits of participation. Principals and teachers attending the conferences often "tested the water" with faculty members, and then contacted us later. Facilitators attending the conference and interested in Project MITT would return to their local area, speak to principals who were "just getting into IGE," and then invite us to visit the local area. The visits served to introduce Project MITT to the selected principals. In many cases the principals then pursued the topic of participation with their faculty members.

The introduction to Project MITT for many schools was dependent upon initial decisions made by an intermediary person, *e.g.*, a state coordinator as a local IGE facilitator. The lack of interest of a state coordinator or regional facilitator in pursuing MITT reduced the potential for contacting schools in those areas. Not all contacts with schools were a function of state coordinator and facilitator assistance. In a few cases direct contact was made with a district central office or with the principal of a school. In no case did the locus of initiation rest with the faculty of a school.

An introduction to Project MITT for the control schools was quite different. Once an IGE school decided to participate in the project, the school superintendent, a central office administrator or the principal of the experimental school then found in the district another school that agreed to serve as a research site. Following the initial location of a potential control school, a detailed explanation of the project was given in person to the principal of the school, and indirectly to the school's faculty.

A major goal of site development activities was to provide the faculty of each interested school with enough knowledge of Project MITT to make an informed decision about participation. Constraints of time, funds, and schedule restricted many opportunities whereby MITT personnel could visit each school, discuss participation with an entire staff, and provide an opportunity for two-way communication. As a result, some decisions were made on limited information and without direct contact between MITT personnel and a full complement of faculty members of par-

ticular schools.

In all but one or two isolated instances, the final decision to participate was made by the faculty of each school in the MITT sample. What varied during the process was the extent to which the decision was based on accurate and full knowledge of the implications of participation and the extent to which a faculty was influenced by the desires and interests of the building principal, a central office employee or a facilitator from an outside agency. The differences among MITT schools with regard to these variations had implications for the implementation of the initial site maintenance activities and the extent to which participants brought with them a sense of commitment to MITT during the first wave of data collection.

The Initial Sample

By late spring cooperative agreements were signed with 43 schools--schools from which MITT representatives would collect "pre" data. All were east of the Mississippi River, the closest some 2,000 miles from the MITT Project headquarters. They ranged in size from a faculty of eight serving 200 students to a faculty of 29 serving over 800 students. The grade organization varied substantially within the sample: several included the seventh and eighth grades, a few were essentially middle schools, and more than half offered kindergarten programs. Most of the schools had a traditional classroom-corridor architectural design, but a few were entirely or partially arranged according to an open-space plan. They were variously situated with

respect to neighborhoods: some were inner-city schools serving low-income families, others were in affluent and not-so-affluent suburbs, and still others in rural America. Most, but not all, were public schools. Included in the initial sample were six parish schools of a Roman Catholic diocese and two schools for dependents of military personnel on an army base.

There were manifest uncertainties, of course, regarding the extent to which the schools would fit the rigorous demands of the research design for the prime study. The design required that all schools would have to be "conventional" (defined as the absence of any operating managerial units) as of the spring of 1974; some number of the schools would then have to form a multi-unit managerial system (two or more units encompassing all or most of the classroom teachers) in the succeeding fall; and another number, hopefully matched by district with the first, would have to remain in the conventional form in the fall. Given the rigor of the design, we estimated that sound inferences could be drawn should only half of the 43 schools unequivocally fit the ideal.

Between the signing of cooperative agreements in the spring and late fall of 1974, reality interceded to affect the ideal in the following ways:

- o One school, an anticipated control, withdrew from participation in MITT partway through the first wave of data collection. (Interviews to assess the school's governance structure were completed and these data became available for provisional analyses.)

- Two anticipated experimental schools were still under construction in late spring and did not have intact staffs or operating programs until the fall.

- Between spring and fall one anticipated control decided to "go IGE" and took the requisite step to qualify as an experimental by forming managerial units.

- The status of one anticipated experimental school in the fall is ambiguous. Evidence indicates that units were formed only in the principal's mind.

- Upon close inquiry, seven anticipated experimentals were found to have had operating managerial units in the spring of 1974 (indeed, for at least a full academic year), hence could not be regarded as conventional at the time of the "pre" data collection.[6]

- Inquiry also revealed that two schools were partially unitized in the spring of 1974 and remained in the same state in the fall; hence, neither were experimentals nor controls.

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[6]All eight had entered into agreements with local agencies for help in implementing the IGE innovation not long before MITT's initial contact with them. It did not occur to us at the time that a school would seek help in introducing an innovation that was already virtually installed.

- o Three of the anomalous schools not fitting the Project design were located in the same school district. This fact plus certain difficulties we had in arranging for data collection in the area led MITT associates to decide to discontinue the district in the study. The one control school for the three anticipated experimentals also was dropped.

After the various defections, changes and discontinuances, 29 schools met the requirements of Project MITT's design for the prime study in the fall of 1974, 16 clear experimentals and 13 clear controls. Only two experimentals lacked a control in the same district and none lacked a control in the same state. The distribution of the 30 schools by district and state is shown in Table 1.

Analyses of data presented in this report sometimes are based on the 29 schools mentioned above and sometimes on a different number. The 16 experimentals, of course, are the main targets of the companion study predictions and are treated in Chapter V as a distinct group. Sections of the report describing the performance of our measures use data from all 40 schools in the spring wave (and one additional school with partial data), inasmuch as large and heterogeneous samples are desiderata for analyses of that sort. As an aid to the reader, we provide the following tabulation which gives the number of schools implicated at each of the two data-taking points classified by the presence or absence of a unitized managerial structure at the same two times.

TABLE 1: Design Status of Twenty-Nine MITT Project Schools, Spring 1975

	Experimental Schools	Control Schools
STATE A		
District 1	-	02
District 3	06	-
District 4	07	-
STATE B		
District 5	08	12
	09	
	10	
	11	
District 6	13	14
District 7	15	16
STATE C		
District 8	17	21
	18	22
	19	
STATE D		
District 9	34	35
District 11	-	29
		30
District 12	33	31
STATE E		
District 14	38	39
District 15	40	41
District 16	42	43
TOTAL SCHOOLS	16	13

Unitized in . . .		Number of schools . . .	
Spring '74	Fall '74	Spring '74	Fall '74
No	No	15	13
No	Yes	16	16
No	Doubtful	-	1
Partial	Partial	2	1
Yes	Yes	7	5
No School	Yes	-	2
	TOTALS	40	38

The two recently constructed schools which introduced unitized management systems in the fall represent a special condition of the implementation of an innovation. They have been retained in the MITT Project for their potential value in illuminating the course of implementation when change from an existing structure is not at stake.

CHAPTER III

Preparation for Research: Development of Measures

The central concepts that would be measured in the MITT Project and basic guides to the measurement process were rather firmly established with our initial formulation of the prime study. Some of the issues of interpretation of the pioneering investigations of Pellegrin at Oregon and of the Stanford group concerned the manner in which certain of their variables had been operationalized, and one of MITT Project's goals was to improve on the measurement procedures of these exploratory studies and thereby to clarify the findings. There remained to the MITT researchers the task of developing the necessary data-taking and measurement procedures related to the concepts.

Here we will give an overview of our developmental work on the main variables of the prime study. Further discussion of the measures can be found in Chapter III, and the rationale and details of three of them are treated in Appendix A (Task Interdependence), Appendix B (Control Structure), and Appendix C (Sense of Autonomy in Work). Description of the predictor variables of the companion study and their measurement is reserved for Chapter IV.

Several considerations underlay our developmental work. The most prominent of these was our intention to measure as distinctly as possible objective attributes of schools, on the one hand, and subjective or phenomenological attributes of teachers, on the other. As we noted earlier, the studies of Pellegrin and especially Meyer and Cohen rested their measures of the location of power and influence in the

school on the impressions of teachers elicited through questionnaire items. These were the same questionnaires that also elicited teachers' affective responses to the objective conditions on which they were reporting (*e.g.*, their job satisfaction) and, hence, cannot be considered empirically independent. Authors of the Stanford group's report took pains to qualify their measures of the objective attributes as measures of teachers' *perceptions* of the attributes, at least in most places. We wished to measure objective attributes directly, not as perceptions. In practice this meant collecting simple or substantiatable facts about the situation or questioning in detail persons who would be in the best position to know and separating these procedures methodologically from procedures for measuring the phenomenological attributes.

Another consideration was our interest in developing psychometrically sound measures, which for the most part, could be treated as interval scales. Parametric methods of data analysis would be a virtual necessity, given the intricacies of analysis implied by the time-series character of the data we would collect as well as the multivariate nature of the hypotheses under investigation.

Finally, in the interests of replication, we believed it wise to repeat certain measures used in the preceding investigations along with new measures developed for the MITT Project. This would certify that conclusions different from the original ones could not be attributed to the use of different measures.

Development of measures central to the prime study are discussed under six headings: managerial structure (unit organization),

instructional organization (task interdependence), the school's control structure, task-related communication, sense of autonomy and collegial power, and job satisfaction. Another important problem for the MITT staff was making the distinction between classroom teacher and specialist. This distinction has a bearing on the subjects of the investigation--who is and is not covered--it deserves a brief comment. Several other measures are taken regularly through the Project questionnaires, either to replicate measuring procedures of the preceding investigations or to serve subsidiary interests and purposes of the Project. For the most part, they were borrowed directly from published sources and entailed no developmental work; they will be treated at relevant points in the report or elsewhere and will not be described here.

Systematic data sources are of four distinct varieties: questionnaires administered in different forms to teachers, principals, and specialists; logs maintained by teachers to record pupils and subjects taught daily; intensive, detailed interviews held with principals and selected teachers (the so-called control structure interviews); and documentary evidence furnished by the schools, districts, and MITT field representatives. Although less systematic in character, another distinct source is the frequent personal contacts between MITT personnel and the school staff by telephone, by annual visits and through regional meetings conducted by MITT's Field Activities Coordinator.

1. Managerial structure. At the outset of the study it was necessary to determine whether or not a school was to be regarded as "unitized" in its mangerial structure. No elaborate measuring proce-

dures were entailed in making the determination, although criteria had to be established to resolve certain anomalous cases. The main sources of information were the staff rosters obtained from schools prior to each data-taking wave and responses to questions asked of principals about "team" formation, membership, and leadership.

In general we considered a school as unitized only if there were two or more acknowledged units or "teams" in the school encompassing most, if not all, grade-level teachers. Omission of kindergarten teachers from units, a fairly common practice, did not disqualify the school. Conversely, we regarded a school as not unitized if there were no teams or units indicated, but in a few instances difficulties arose in classifying the school in one category or the other. Occasionally, informal teams were said to exist in the school or the primary and intermediate faculties were listed as though they were units. We had to establish, by further inquiry, whether they held meetings with sufficient regularity or performed managerial or governance functions of sufficient importance to consider them formal elements of the structure. On other occasions, especially during the spring of 1974 in the schools that had made a commitment to adopt the IGE innovation, teachers who would operate as a team in the succeeding fall began sporadic meetings to begin planning for the fall or to receive team training. Again further inquiry was necessary to determine whether the units were only "anticipatory" or whether they were, in fact, operational in the on-going school program.

It was also essential to determine on a continuing basis the membership of the various teams, if a school were so organized, and the

leaders of the teams, if such were formally designated. This was readily accomplished through our procedure for rostering each school's faculty.

2. Instructional organization. The MITT staff undertook extensive work both to conceptualize and to develop procedures for describing the ways in which the school's instructional program is organized and conducted. Our attention centered on the division of labor among classroom teachers and the scheme for allocating pupils and subject-matter areas to the instructional personnel. A key concept of the analysis is *pupilflow* (akin to workflow in industrial settings), pointing to the movement of pupils from teacher to teacher for instruction in the several subjects in the course of a day, week, or month.

The self-contained classroom pattern can be recognized, for example, as the case of zero movement from teacher to teacher, so long as the span of time under consideration is less than a school term or year. A pupil receives all of his instruction from a single teacher. Alternatively, two or more teachers may be implicated in the same pupilflow, in which event a form of *task interdependence* can be said to exist among them. One form of task interdependence familiar at the secondary-school level is the case in which students move between teachers for instruction in different subjects. Looking at it from the teacher's perspective, s/he is linked with other teachers by virtue of sharing students in the pupilflow. This pattern is sometimes referred to as departmentalization, and it involves a minimal level of task interdependence, as we justify in Appendix A where the conceptualization is presented in greater detail.

A stronger form of task interdependence arises among teachers when teachers instruct the same pupils in the same subject area or areas. As examples, two teachers may pool their classes once every other week for joint instruction in health, and a modest level of interdependence; or one teacher may conduct a large-group science demonstration one day and divide the pupils into two small discussion groups on the next day conducted by himself and the other teacher. A more intensive level of task interdependence, approximating the meaning some writers attach to "team teaching," would be the case of two teachers who teach reading together on a daily basis (Shaplin, 1964).

It is possible to index the "jointness" of instruction between two teachers working with the same pupils in the same subject areas by observing the *rate of pupil exchange* between them. This index is what we call the *intensity of instructional interdependence*, and its construction is described in Appendix A.

Given the formulation, the base information from which descriptions of instructional organization can be derived is rather mundane. One need only learn, for some representative time interval, who teaches what subjects to which pupils on what days. MITT associates considered a number of alternatives for obtaining such information and eventually settled on a simple logging procedure kept by each classroom teacher for recording, by subject, which students were present for instruction. Several logging forms were developed and tried in nearby schools. The form that seemed most convenient and least prone to error was something like an attendance booklet, listing pupils down the side with half pages

for each subject a teacher might teach, sub-ruled by days of the week. Teachers were instructed to use it like an attendance book, checking the pupils who were present each day for the subjects that they actually taught. Since we were uninterested in the vagaries of attendance because of illness and the like, we also instructed teachers that they might be able to complete the logs in advance if their instructional pattern was highly regular and unlikely to change as it would be in the self-contained pattern. The time interval was ten consecutive days of logging.

Besides limiting the time interval to two weeks, several other procedural decisions restricted coverage of the school's instructional organization. The most significant of these was the selection of subject areas. We asked teachers to keep records only on subjects that are central to responsibilities of grade-level teachers in virtually all elementary schools of the nation: math, reading, science, social studies, and language arts. Excluded were the more esoteric subject areas that might be encountered in a few schools and subjects that often (but not always) are taught by itinerant or resident subject-matter specialists, such as art, music, or physical education. As we emphasize later, the implications in the professional literature regarding team organization in schools, and certainly those in the Pellegrin and the Meyer and Cohen studies, concern effects on the regular classroom instructors--grade-level teachers--taking for granted the presence in many schools of special teachers for the more tangential or skill subjects of the curriculum.

Our restriction of the logs to the five core subject areas meant, concomitantly, that we asked only the regular grade-level teachers to complete them; neither specialists nor non-certificated personnel, such as instructional aides, were implicated in the recording procedures, so our descriptions of task interdependencies relate specifically to the interdependencies among classroom teachers.

To simplify the recording procedures for the respondents, we also decided to pre-list the pupils in the log booklets. This was accomplished by drawing a random sample, stratified by classrooms and grade-level (either six or seven pupils per classroom), from pupil rosters furnished by the schools prior to each data collection, and preparing special booklets for each school. Names of pupils were grouped by classroom and grade level to facilitate the teachers' task of locating the pupils whom s/he might teach during the two weeks. Pupil sampling, like the time sampling, implies that we obtain an estimate of task interdependencies, not an exhaustive count.

Procedures for assembling the base information obtained through the teacher logs and other information regarding methodology is given in Appendix A of the report.

3. Control structure of the school. Our general term, control structure, covers the domains of inquiry of Pellegrin and the Stanford group into teacher autonomy, power, influence, and governance of educational decisions. Since the analytical language for discourse on these matters is poorly articulated, substantial effort was devoted in the Project to conceptual development. The specific findings of the studies

can be stated with deceptive simplicity.

Pellegrin's study, focusing primarily on decisions internal to the classroom, was the more explicit of the two in suggesting the nature of the shifts in power associated with "team organization" of the school. He observed that teachers in his control schools exercised a considerable amount of individual discretion in conducting classroom instructional programs, making decisions "either alone, in consultation with the principal, or within certain limits prescribed and/or enforced by him" (Pellegrin, 1970a, p.6). Both the principal and teachers, he notes, were constrained in their choices by guidelines and policies set by district-wide committees, central office subject-matter specialists, and others. Group decision processes implicating fellow teachers within the school were rarely reported by Pellegrin's respondents. Rather, activities of each separate classroom were determined primarily by the teacher, and monitored to a greater or lesser degree by the principal.

In the Multi-unit schools, in contrast, the unit faculty emerged as a key decision-making power. When the principal entered the decision process, it was not as an independent authority figure or limit setter working in a one-to-one relationship with individual teachers, but as a member of a group of decision makers. According to Pellegrin, guideline and policies of the central office less often acted as constraining influences. At the same time, individual teachers lost much of the discretion they enjoyed in the conventional schools to the unit faculty. Meyer and Cohen's observations on decisions regarding classroom affairs were of much the same order as Pellegrin's, with one prominent exception:

their measures failed to reveal the loss of individual autonomy of teachers in the team-organized schools.[7] In regard to the governance of school-wide decisions, both investigations reached the same conclusion. Teachers in the experimental schools attributed greater influence to the collegial group than respondents in the control schools without diminishing the attributed influence of the principal at the same time.

These findings deal mainly with the locus of authoritative decisions in the school: who (or what groups) legitimately make what decisions affecting whose behavior. They do not speak to the subtle dynamics of the decision process itself nor to the extent of compliance with decisions, and only peripherally do they concern mechanisms of enforcement. As significant as these related matters may be, the central issue is a structural one--the arenas of decision-making authority and the rights of participation.

Even narrowly conceived, the school's control structure and the changes in it described by the investigators are unexpectedly intricate when it comes to stating them with the degree of rigor required for measurement. Variations occur simultaneously along a number of related dimensions. Just within the simple situation of conventional schools, for example, schools may vary in the extent to which their instructional programs must operate within constraints imposed by district policy and guidelines. Variations may also arise in the degree to which the principal or other supervisors oversee affairs of the

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[7]See Chapter IV.

individual classrooms, which in turn may vary from one classroom to the next. Moreover, the structure of the teacher's handling of classroom discipline assumes a different form from the structure for selecting curricular materials. District policies may be prescriptive in some domains but not in others and, moreover, principals may be active decision makers across many areas of the school or only in selected areas, or they may be largely inactive.

Organization of the school by units adds further dimensions of variation. Three new loci for decisions typically are created by such reorganization: unit faculties, unit leaders (individually), and the group of unit leaders, usually with the principal as a member. Each may be accorded certain decision-making prerogatives intended to be binding on a sub-set of classrooms or on the school as a whole. Changes in control structure suggested by Pellegrin and by Meyer and Cohen implicate all of these dimensions, including some not mentioned here, and the MITT staff's effort to come to terms with the complexities at both the conceptual and operational levels is documented in Appendix B.

In brief, it was necessary for the Project staff 1) to devise procedures that would identify issues requiring periodic decision in elementary schools of the study (separately at the classroom and school levels), 2) to determine the locus of those decisions in terms of the personnel authorized to make them, and 3) to define which teachers or groups of teachers were supposed to be affected by them--and to do this without undue reliance on subjective impressions or uninformed guesses. It became apparent that the data would have to be obtained through

intensive, detailed interviews with knowledgeable informants in each school, going into the specifics of decision making in a variety of domains. The only viable alternative for getting such detailed information--that of stationing observers in the schools to make first-hand documentations of the decision processes--was beyond the means of the Project.

The Project staff launched a six-month effort to develop an appropriate interview schedule and recording form. Several trial forms were produced, field tested with local informants, and the responses reduced to the requisite indicators of control structure as a test of their ultimate utility. Procedures for training interviewers were also worked out. The final form of the so-called control structure interview and the rules for data reduction are in the appendix.

4. Task-related communication. The Stanford researchers measured the task-related communication among teachers by asking them to report the frequency with which they talked informally with other teachers about each of six specific task areas: the educational goals and objectives of the school, school rules and regulations, grading students, curriculum planning, teaching specific lessons or classes, and student discipline and control.[8] Frequency categories ranged from "at least once a day" to "less than once a month" and "never." They constructed an Index of Informal Work Interaction by weighting the

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[8]Pellegrin did not measure teacher interaction or communication in his study.

reported frequencies of interaction and summing the weighted scores over the six task areas for an over-all score for each teacher. A second measure, the Index of Group Interaction, was obtained in an identical manner except that teachers were asked about their discussions "when you meet with school committees, teams, or teacher groups." (They repeated the questions once again to index the teachers' interaction with the principal).

MITT associates decided to use a basically different procedure for measuring teacher communication, one which asks teachers to "nominate" the specific persons in the school with whom they talk regularly and to report the frequency and topics of their interaction with each person. The procedure had been extensively developed in previous research with elementary and secondary teachers. (See Charters, 1969.) Rather than asking about specific task areas of discussion, as Meyer and Cohen did, we used one general topic, "classroom activities," to parallel their measure of task-related interaction. We offered two other general categories for describing the topics of discussion, "school-wide matters" and "matters unrelated to school or teaching." The categories for frequency of discussions were similar to those used by the Stanford group. Our decision to add a measure of communication on school-wide affairs was grounded on our interest in distinguishing the effects of changes in the school's instructional organization which we reasoned would affect communication about classroom activities from changes in managerial structure (whose effects would more likely be confined to communication on school-wide matters).

Most of our analyses and scoring procedures are based on verified reports of communication between teachers. That is to say, we record episodes of communication for a teacher only if his or her nominations are reciprocated by the nominees. Procedural details regarding reciprocation and the derivation of frequency scores are given in Chapter IV. We need only say here that the values of the frequency scores were designed to reflect a weekly rate of communcation.

The nomination procedure for measuring teacher communication allows the MITT Project to identify patterns of communication that emerge in schools undergoing radical reorganization. It would be expected, for example, that unit formation would increase rates of communication specifically among unit members and not across all teachers in the school; and, if certain observational studies of team organization are to be believed (Gallessich, Paiscoe, and Payne, 1971), it might extend so far as to effectively insulate the units from one another. Sociometric-like procedures applied to the nominations data allows for detailed study of changes in communication networks.

The MITT procedure also permits the derivation of communication scores similar to those used in the Stanford investigation. In fact, three scores of the teacher's task-related communication (about classroom activities) with other teachers have been derived. Operations for computing them are as follows. First, a simple count is made of the number of persons nominated by a given teacher, excluding all nominees except classroom teachers. The count can be made on either verified or unverified nominations. This number gives the *extensity* of his or her

task-related communication. Second, the weighted frequencies of his or her discussions are summed over all of the teachers s/he nominates to yield the general *volume* of his or her communication. By dividing volume by the number of nominees, a third measure is obtained indicating the *intensity* of his or her task-related communication, or more simply the average frequency of his or her dicussions per nominee. These scores enable us to determine whether the increases in task-related communication reported by the Stanford investigators are the result of teachers talking to more of their colleagues or talking more frequently to the same number or both. Extensity, intensity, and volume scores can be obtained, of course, for communication relating to school-wide affairs and to non-work matters. They can be obtained, too, for other classes of nominees besides classroom teachers, such as administrators and special subject teachers. However, since communication forms were not universally received from these people, calculations must be limited to unverified nominations.

After the first wave of data collection, MITT staff members modified the procedure for soliciting nominations from teachers. In the first questionnnaries respondents were asked to write in names of nominees under three headings, "teachers," "classroom helpers," and "administrators and non-teaching specialists." Name writing proved to be an arduous task for the respondents because of the rather long questionnaire. Moreover, the format yielded names that were difficult to decipher or to confirm with respect to their status in the school staff, In any case, our procedure furnished more information than was essential to the propositions the Project sought to assess. The propositions concerned only teacher-teacher communication.

To resolve the problems, questionnaires in the second wave of data collection had the school's faculty pre-listed on the communication forms, eliminating the need for name writing on the part of teachers and indicating unambiguously the names of staff members in whom we were specifically interested. Based on staff rosters obtained from each school, the listing included the principal and assistant principal (if present), all professional grade-level teachers, and all other certificated staff members employed full time in the school.[9] In other respects the communication form remained the same. Analyses will be undertaken in the near future: 1) to determine the impact of the procedural change on our communication measures, especially the extensity measure, and 2) to develop appropriate corrections for the second-wave scores.

Several empirical tests were made of the performance of the (verified) communication measures, using data from the spring of 1974 (40 schools). Of greatest relevance here is our inspection (of the extent) of relationship between the teacher's task-related communication on school-wide and non-work matters. In general the extensity scores on the three topics were highly intercorrelated--far more so than the intensity scores. (See Table 2.) That is, the number of fellow teachers nominated by a teacher as conversants about classroom matters corresponded closely to the number nominated as conversants about the other topics.

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[9]The certificated staff other than grade-level teachers includes such personnel as subject-matter teachers of music and art or non-teaching specialists like librarians and school psychologists. We discuss the definitional problems in a following section.

TABLE 2: Intercorrelations of Verified Teacher Communication Scores (Extensity and Intensity) on Three Topics, MITT Teachers, Spring 1974. N = 619

	Extensity Scores		Intensity Scores	
	School-wide Affairs	Non-work Matters	School-wide Affairs	Non-work Matters
Classroom Activities	.79	.78	.49	.46
School-wide Matters		.85		.57

Note that the correspondence is between the *number* of names listed, and verified, not the particular persons nominated.

The intensity of a teacher's communication about one topic is only modestly predictive of his or her intensity of communication on the other topics. The zero-order correlations shown in Table 2 fall between .4 and .6. For both intensity and extensity scores, there is a closer correspondence between non-work matters and school-wide matters than between non-work matters and classroom affairs.

Over all teachers in the 40 schools (619 of them), the average teacher talked to about three or four colleagues on one or another of the topics and talked to each at the rate of about twice a week. The actual values of the mean intensity scores were 2.0 for school-wide affairs, 2.3 for non-work matters, and 2.5 for classroom affairs. The values can be interpreted by recognizing that a score of 1 roughly represents weekly communication and a score of 5 daily communication (five times weekly).

5. Sense of autonomy and collegial power. A central feature of the MITT Project, as we have previously remarked, was to measure the objective distribution of power and teachers' impressions of, or feelings about, the locus of power as two separate and distinct attributes. The findings of Pellegrin and of the Stanford investigators regarding teacher autonomy and collegial power were based on measurement procedures that were more likely to reflect subjective feelings than objective fact. Sub-section 3, above, concerns our objective measures of the school's control structure, so this section reports on measures of the two key subjective variables: the teacher's sense of autonomy in work and his or her sense of collegial power in school affairs.

The development of the sense of autonomy measure and the scale itself are presented in Appendix C and the details need not be repeated here. But several comments about it are in order. The MITT associates developed a new measure of sense of autonomy because of certain methodological shortcomings noted in the Meyer and Cohen Index of Individual Autonomy, quite apart from the equivocation regarding its status as an objective or subjective measure. The Stanford group had obtained their index from one of a series of questions asking teachers to report "how much influence" various groups or individuals exerted over several aspects of classroom operations, such as student grading or the teaching of specific lessons. In the series were questions about the influence of the principal, of committees and groups of teachers, and of teachers as separate individuals. The autonomy index came from one asking the teacher "How much influence do you have over your *own* . . ." [student grading, teaching of specific lessons, etc.]. The respondent could mark an alternative ranging from "a great deal" to "none," and the index was derived for the teacher by summing his or her responses, appropriately weighted, over the several aspects of instruction. The other questions in the series regarding the influence of the principal, teacher groups, and individual teachers on instructional affairs of the classroom followed an identical format. So did another series of questions concerning the influence of the principal, teacher groups, and individual teachers on several school-wide issues; the issues were only slightly different in wording and the visual presentation of the two series in the questionnaire was the same.

MITT associates recognized that the strong relationships reported by Meyer and Cohen among the several indexes derived from the two series, including the autonomy index and the Index of Teacher Group Influence within the school, could have been the result in part of an instrument effect--the similarity in item presentations. In addition, the wording of the autonomy question seemed awkward, requiring the teacher to report the amount of his or her own influence on his or her own behavior. It was for these reasons that the Project staff developed a new sense of autonomy scale.[11]

The measure that was developed consisted of a 24-item summative scale with a Likert-style response format expressly designed to assess teacher affect. The mean score for approximately 600 classroom teachers in the 40 elementary schools of the first wave of data taking was 4.67 in a range from 1 to 6 (6 representing a strong sense of autonomy). The standard deviation was .578, but the distribution had a pronounced negative skew. An internal consistency type of reliability estimate for the scale produced a value of .90.

For the measure of sense of collegial power, the MITT staff decided to borrow directly one of the questions from the Stanford series, concerning the influence of teacher groups on school affairs rather than to develop a new one. Meyer and Cohen referred to it as the Index

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[11]The Meyer and Cohen autonomy question, indeed the entire set of questions from the two series of the Stanford investigation, were retained in the MITT questionnaire in the interests of replication.

of Teacher Group Influence within the School and used it extensively in the analyses of their report. The question read, "How much influence do school committees, teams, or groups (*e.g.*, same grade level or subject area) have over . . ." followed by five specific school-wide issues related to the educational program:

(a) determining the educational goals and objectives of the school,
(b) establishing school rules and regulations,
(c) student grading practices,
(d) general curriculum planning,
(e) student control and discipline procedures.

Response alternatives were "a great deal," "a considerable amount," "a moderate amount," "not very much," and "none." Scoring procedures entailed giving weights to the alternatives from 5 to 1 (most to least attributed influence), summing the weighted responses over the five areas, and dividing by five. (The division permits the score to reflect category descriptions of amount of influence.)

MITT researchers were concerned, however, that the wording of this question with its reference to committees, teams, and similar groups served to bias responses in favor of unit-organized schools where such groups necessarily existed, by definition. Hence, a second question from the Stanford series also was used, identical in format except that it asked "How much influence do individual teachers here in this school have over . . ." [the five issues]. The scoring procedure was the same.

The means of scores on the two scales were similar in the 40-school sample, reflecting teachers' inclinations to attribute "moderate" influence to their colleagues (individually or in groups) over educationally relevant issues of the school.

	Mean	S.D.
Collegial power (groups)	3.13	.881
Collegial power (individuals)	3.22	.791

The scores were normally distributed except for a moderate negative skew in the group power question. Internal consistency reliability coefficients were estimated as .86 and .90 for the group and individual versions of the scales, respectively.

An important methodological problem faced MITT researchers in developing these and other measures of subjective attributes of teachers. This was the problem of certifying that the several measures of subjective feelings embedded in the same questionnaires were tapping independent aspects rather than measuring the same (unknown) attribute of teachers in different ways. To establish independence, the MITT staff conducted several factor analyses of the questionnaire items using data from the field trial mentioned above. The results of the investigation are reported in Appendix D of the report. In brief, the two measures of sense of collegial power were found to be substantially independent of one another in factor structure and each to be independent of other key subjective attributes measured in the MITT Project.

6. Job satisfaction. Although using rather different measures of job satisfaction, the two pioneering investigations reported greater satisfaction among teachers in the experimental schools than in the control schools of their respective studies. Pellegrin had fashioned his measure after the work of Herzberg (1965), incorporating

items to represent Motivators (or Satisfiers) and Hygienic Factors (or Dissatisfiers), and the items focused on aspects of the work situation itself. The Stanford items, on the other hand, tended to focus more globally on the teacher's satisfaction with his or her career. The MITT staff decided to include both Pellegrin's 10-item measure and Meyer and Cohen's 5-question measure in the Project study.

The Pellegrin scale, slightly modified by the MITT staff, asks teachers to indicate how fully their work situation conforms to a set of conditions: "completely," "to a considerable extent," "to a small extent," or "not at all." The question begins, "In your present teaching situation, to what extent . . ." and the conditions follow:

> Do your teaching efforts indicate that you will be making progress toward the professional goals that you have set for yourself?
>
> Are your efforts and achievements recognized by others?
>
> Do you have the authority to direct the work for which you are responsible?
>
> Are you able to see positive results from your work efforts?
>
> Does the work for which you are responsible indicate your career expectations are being realized?

Those five are the so-called Motivators in Herzberg's terminology. Intermixed with them on the questionnaire form are the Hygienic Conditions, or Dissatisfiers:

> Are the school and school district policies and regulations unfair?
>
> Are your personal relationships with administrators and supervisors unpleasant?

Do administrators and supervisors show an inability or unwillingness to give you help when you need it?

Are your personal relationships with fellow teachers unpleasant?

Are pertinent instructional materials and aids unavailable?

For purposes of scoring, weights from 5 to 1 were assigned the response alternatives for the Motivators ("completely" = 5) and reversed for the Hygienic Factors ("not at all" = 5); weighted responses were summed over the items and divided by 10. Thus, the Pellegrin scale scores could range from a low of 1.0 to a high of 4.0. We call this scale *work satisfaction* to distinguish it from the job-career *satisfaction scale* from Meyer and Cohen.

The Stanford measure had different response alternatives for each of the five questions in the scale. The questions, alternatives, and weighting system is shown below:

1. How satisfied are you with your present job?

   5 Very satisfied
   4 Satisfied
   3 Partly satisfied, partly dissatisfied
   2 Dissatisfied
   1 Very dissatisfied

2. How satisfied are you with teaching as an occupation?

   [Same alternatives and weights as in Ques. 1.]

3. If you were offered a good job outside of education at a good salary, which did not involve much close contact with people, how likely would you be to accept?

   1 Very likely
   2 Somewhat likely
   3 Somewhat unlikely
   4 Very unlikely

4. If you were offered a good job outside of education at a good salary which would involve close contact with people, how likely would you be to accept?

   [Same alternatives and weights as in Ques. 3.]

5. If you were given the chance to go back to college days and start over, how likely would you be to choose teaching as a career?

   4 Certainly
   3 Probably
   2 About even for and against
   1 Probably or certainly not

Again, the job-career satisfaction scores were formed by summing the weighted responses over the five items. In this instance, however, we did not choose to divide the sum by the number of items but used the raw sum as the score. Thus, scores on this scale could range from a low of 5 to a high of 22.

The means and standard deviations of the two scales, based on the 40-school sample, are given below:

	Mean	S.D.
Work satisfaction	3.26	.340
Job-career satisfaction	17.75	3.350

As these means indicate, teacher scores fall toward the high ends of the scales (4.0 and 22.0, respectively) and both distributions are prominently skewed in a negative direction, the job-career satisfaction distribution more so than the distribution of work satisfaction scores. This is a common condition of measures of job satisfaction among teachers. Examination of the psychometric properties of the measures showed the Pellegrin work satisfaction scale to be weak in a number of respects and

less use of it is made in the present report. (See Appendix D for further details on the two measures.)

The distinction between classroom teachers and subject specialists. The task of specifying firmly who would and who would not be regarded a classroom teacher arose early in the preparatory work to confront the MITT staff. It seemed clear that it was the role of the "regular grade-level teacher" that was the center of attention in the reports of Pellegrin and of Meyer and Cohen and not that of the sundry subject-matter specialists, such as teachers of art, music, physical education, remedial reading, or the physically or mentally handicapped, who commonly inhabit the elementary school. Also, the professional writings on program changes and role changes associated with team teaching, the multi-unit school, or Individually Guided Education similarly allude specifically to the "classroom teacher."

In light of the diversity of staff personnel in contemporary elementary schools--a diversity that was surprisingly great in some of our schools but virtually absent in others--the distinction between classroom teacher and subject specialist is easier to state than to operationalize. In general, we had little trouble excluding personnel who indicated that they had no teaching responsibilities, such as principals, assistant principals, school counselors, and librarians. In the event they also had a regular class assigned to them (typically the case only of assistant principals), they were regarded as classroom teachers. We arbitrarily excluded teaching and non-teaching staff members who did not hold teaching certificates, such as secretaries,

nurses, instructional aides or other paraprofessionals, and volunteers. Substitute teachers were counted as regular teachers if we had reason to believe they were long-term replacements rather than temporary fill-ins on the day questionnaires were distributed.

More troublesome was the task of excluding subject-matter teachers and other specialists, since the titles varied widely and the conventions for designating the responsibilities of personnel in terms of their classroom teaching assignments were not standard in the schools of the study. A few schools would include on their staff rosters EMR teachers (of the educable mentally retarded), reading teachers, tutors, or teachers in a program for bilingual students who apparently drew pupils from the regular classrooms either singly or in small groups from time to time for special instruction. We decided to treat these teachers just as we did the teachers of art, music, physical education, band, homemaking, and other subject areas and exclude them from the category of "regular grade-level teacher."

In the end, the best operational clue for the inclusion of a staff member as a classroom was his or her appearance on the school's staff roster with simply a grade level (kindergarten to sixth or eighth) indicating his assignment, unqualified by phrases like "Bi-lingual 1-2-3" or "Primary Reading." Kindergarten teachers were included in schools where they appeared, despite our recognition that kindergarten programs are not always integrated into the regular graded curriculum; it was administratively easier to include than exclude them. In a similar way, we usually obtained data from seventh- and eighth-grade teachers in the

few schools of the sample that had K-8 or 1-8 programs. In many elementary schools, however, the seventh and eighth grades are less inclined to operate as self-contained entities, and the changes implied by team teaching, unit organization, IGE, and the like either take on different dimensions from the first six grades or are inapplicable altogether. We have the capability, of course, of excluding both kindergarten and upper-grade teachers from our data analyses where it is important to do so.

The most important point at which our restriction of the sample to regular grade-level teachers affects our data is the description of the school's instructional organization. Our measures systematically underestimates the task interdependence among teaching personnel, if by teaching personnel we mean to include teachers of special subjects and others who draw students from regular classrooms for some specialized type of instruction.

By our definition of regular grade-level teacher, we found 674 staff members who qualified for the term in the 40 schools of the first wave of data collection. The smallest was a school of eight teachers (Grades 1-8) and the largest a school of 29 teachers (K-6). Useable questionnaires were obtained from 92 per cent of the teachers in the spring of 1974. For the 640 teachers in the 38 schools of the second wave of data-taking, fall 1974, the useable returns increased to 98 percent.

CHAPTER IV

Governance and Interdependence: Preliminary Findings

The prime study of the MITT Project is designed to test rigorously the interpretation offered by Pellegrin (1970a, 1970b) and by Meyer and Cohen (1971) regarding the consequences of reorganizing the faculty of an elementary school into teams. As we outlined in Chapter I, these two sets of investigators, comparing Multi-unit schools with control schools or open-space-team-organized schools with controls, found differences between their faculties with respect to the extent of task-oriented interaction, interdependence of work relations, faculty control over instructional and curricular issues of classroom and school, the teacher's autonomy in work, and job satisfaction. While the comparative design of the investigations does not give evidence on the direction of causality, the investigators interpreted the differences to be caused by the criterion variables they used in selecting schools for comparison, *i.e.*, the presence or absence of team organization and/or open-space architecture.

There are, however, certain ambiguities in the interpretation of the findings and certain alternative hypotheses that could fit results of the studies equally well, as both investigators took care to point out in their reports. We have discussed these, too, in our first chapter. One of the alternative interpretations of the Pellegrin and the Meyer and Cohen findings can be checked for its validity at least on a tentative basis in data from the first wave of the MITT study. This concerns the direction of causality. In particular, one could plausibly

argue from the data of the pioneering investigations that the reorganization of the faculty into teams did not cause the differences in the staff attributes of communication, influence, job satisfaction and so on but, rather, was the effect of them. Said differently, it is reasonable to believe that schools in which the staffs are heavily involved in task-oriented interaction, in which they have the greatest influence in decision making, and have the highest levels of job satisfaction are precisely the schools in which reorganization is most likely to occur. Were this interpretation true, we would expect to discover that teachers in the 16 MITT schools destined to form a team organization in the fall of 1974 would already, in the preceding spring, differ from the control schools with regard to these attributes. This chapter examines the possibility.

Before we present the comparative evidence, it is advisable to report in greater specificity that the summary in Chapter I the findings of the earlier investigations, giving especial attention to the Stanford researchers' analysis efforts directed toward developing, at least theoretically, a causal chain among the basic variables. Then we turn to the grounds for the MITT Project's distinction between "experimental" and "control" schools, providing a characterization of the schools so distinguished by our criterion. Finally we present and discuss the pre-reorganization status of the experimental schools with regard to the variables relevant to the alternative hypothesis.

The Implied Causal Model and an Alternative

Early in Chapter I we summarized the parallel findings of the comparative studies of Pellegrin and of Meyer and Cohen. Pellegrin selected schools on the basis of a programmatic criterion, contrasting schools that were implementing the Multiunit School model of the Wisconsin R & D Center with those that were not, while the Stanford group chose comparison schools on an architectural and a formal organization criterion, contrasting schools with an open-space design *and* with formally organized teaching teams against schools lacking both attributes. First-order comparisons of the two investigations showed that teachers in the "experimental" schools exceeded those in "controls" with respect to:

- Task-oriented interaction with fellow teachers [Meyer & Cohen]
- Interdependence in work relations [Pellegrin]
- Control of instruction-related decisions by collegial groups [Pellegrin, Meyer & Cohen]
- Influence of collegial groups on school-wide operations [Pellegrin, Meyer & Cohen]
- Autonomy in conducting the work of teaching [Meyer & Cohen]
- Job satisfaction [Pellegrin, Meyer & Cohen]

Certain additional comparisons were made as well, some of which are noted in subsequent paragraphs, but these represent the central differences found between "experimental" and "control" schools in the investigations and taken as problemmatic in MITT's prime study. While reports of the Pellegrin investigation did not go beyond first-order comparisons between school type and the separate variables, concentrating instead on contextual analyses of the three Multi-unit schools, Meyer and Cohen examined a

number of second- and, occasionally, third-order relationships in order to test linkages that they postulated on theoretical grounds would hold among the variables of their study.[1]

We have constructed in Figure 1 the causal model that we believe accurately represents the theorizing and findings of the Stanford investigators. We have added two variables of the Pellegrin study for points of reference (indicated by the broken boxes) and describe the variables more generically or somewhat differently from the report authors, but otherwise the diagram corresponds closely to the scheme Meyer and Cohen (1971, p. 89) displayed in Table 2 of their monograph.[2] Arrows connecting two variables indicate that the Stanford researchers found a relationship between them, with at least one other variable controlled. Our designation of the variables and the Stanford measures of them follow:

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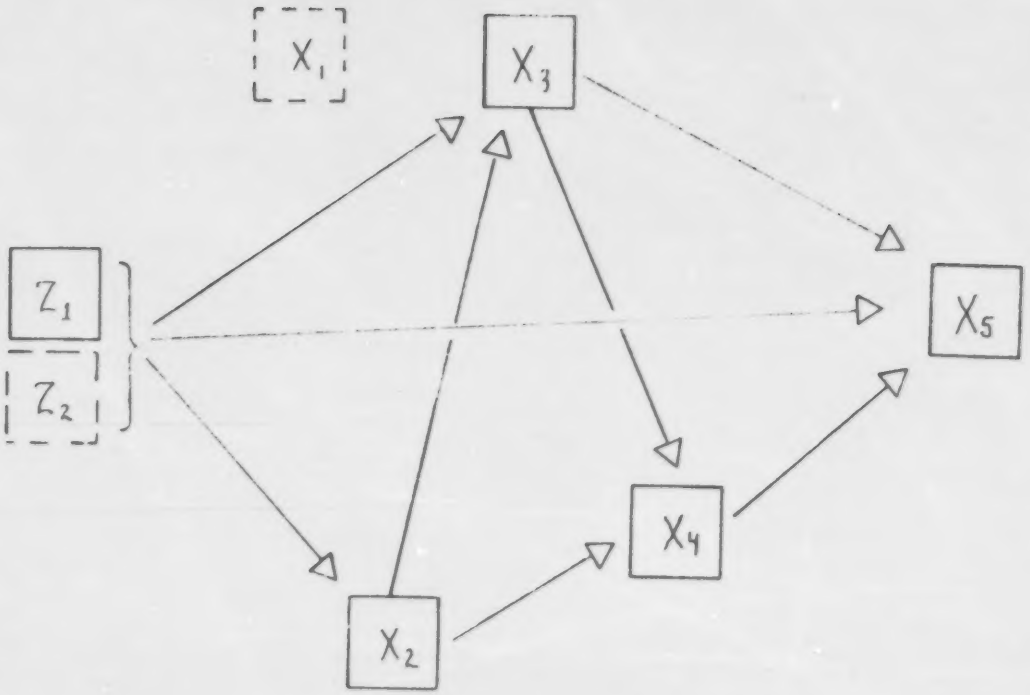
[1]The Stanford group, unlike Pellegrin, took the teacher as the unit of analysis, considering the school, or the school type, the teacher's "environment" and thereby had a far greater number of cases for statistical treatment than Pellegrin's N of 6.

In one unpublished analysis, Pellegrin tested the relationship between the teacher's report of the locus of instructional decisions and his level of job satisfaction (with generally inconclusive results), and MITT staff members conducted a few additional analyses of Pellegrin's original data. These are reported in Packard, *et al.*, (1973).

[2]We were obliged to refer to the text of the Stanford report to establish the causal priority of the Sense of Collegial Power variable *vis-a-vis* Sense of Autonomy. Also, the figure omits the peer evaluation variables of the Stanford study, which MITT is not investigating.

FIGURE 1. Causal model adapted from Meyer and Cohen (1971)



Variable list

Z_1 Unitized structure
Z_2 Task interdependence
X_1 Collegial control structure
X_2 Task-related communication
X_3 Sense of collegial power
X_4 Sense of autonomy
X_5 Job satisfaction

MITT Designation		Meyer and Cohen
Z_1	Unitized Structure (vs. Not)	Open-space (vs. Self-contained)
Z_2	Task Interdependence	
X_1	Collegial Control Structure	[not measured]
X_2	Task-related Communication	Index of Group Interaction
X_3	Sense of Collegial Power	Index of Teacher Group Influence, School
X_4	Sense of Autonomy	Index of Individual Autonomy
X_5	Job Satisfaction	Job Satisfaction

(We have referred to Meyer and Cohen's measure of X_5 as "Job-Career Satisfaction" to distinquish it from Pellegrin's "Work Satisfaction.") A number of comments are in order regarding the variables of the diagram and their relationships.

1. The first two variables, shown on the far left of the figure, represent one of the basic equivocalities addressed by the MITT Project. The question is simply whether the effects found on the variables to the right by the Stanford group are attributable to the *managerial* organization or to the *instructional* organization of the "open-space vs. self-contained" schools selected for comparison. Meyer and Cohen's types of school were known to differ with respect to formal unit organization but no measures were taken of instructional organization, or, as Pellegrin and we call it, task interdependence. While Pellegrin sought to measure task interdependence in his Multi-unit and control schools, the operational procedures, as we noted in Chapter I and elsewhere (Charters, 1973; Packard, *et al.*, 1973), could be interpreted as representing either a

difference in the school's managerial system or in its work system, and the MITT study incorporates a direct, systematic measure of the latter.

School architecture remained an unresolved question, since it was confounded in the school-type variable of the Meyer and Cohen investigation. The differences found by Pellegrin, however, did not hinge on whether or not the schools were built with open areas; some of his control schools had an open-space design, while one of the Multi-unit schools was in an old, traditionally constructed building. The significance of the architectural factor is an unsettled question and must remain so, insofar as the MITT Project is concerned, since none of the schools of the MITT sample are open space in design.

2. The effect of school type on teacher-to-teacher communication, as reported by Meyer and Cohen, was strong. They measured communication by asking teachers to report the frequency of their informal discussions in groups or committees about the same matters. On both counts the teachers in the open-space schools reported substantially higher rates of interaction than those in the controls. The differences in group interaction were especially pronounced, and it was the group communication measure that the authors subsequently used to trace relationships with other variables. The MITT Project procedures for measuring communication do not separate informal and group interaction, but they permit the derivation of measures of teacher-teacher communication about school affairs generally and about matters unrelated to work as well as about classroom-related matters. The distinction between classroom-related and school-related communication was introduced to help decide whether

the effects of school type are due to managerial or instructional reorganization.

3. Both task-related communication and school type independently affected the level of teacher control over affairs of the school, according to the Stanford report. That is, the influence teachers attributed to teacher groups (Meyer and Cohen's indicator of control structure) was greater among teachers with higher communication scores and greater in open-space than control schools, holding constant the other variable. They found less influence attributed to the principal in open-space schools, incidentally.[3] Using a more direct measure of control structure, which focused on the locus of particular decisions rather than depending on attributions of influence, Pellegrin too showed greater collegiality in Multi-Unit schools than in control schools. The concern we displayed in Chapter I for distinguishing between objective conditions of power and subjective, or phenomenological, responses to such conditions has led us to represent them as distinct variables in Figure 1 (X_1 and X_3) and to regard the Stanford Measure as an indicator of the subjective attribute, Sense of Collegial Power.

4. The teacher's feeling of classroom autonomy (X_4), as measured by the Stanford researchers, was found to be directly and independently related both to the extent of his task-related communication with

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[3] Pellegrin (1970b) offered observations on changes of the principal's role in the Multi-unit school. Our own re-analysis of the Stanford data (Packard, *et al.*, 1973) as well as analysis of the attributed influence measures obtained in the MITT questionnaire strongly indicate that influence attributed to the principal varies independently of influence attributed to teachers and teacher groups in the school and is not noticeably related to organizational or programmatic characteristics of the school.

fellow teachers (X_2) and the amount of influence on school-wide affairs he attributed to collegial groups (X_3). The direct rather than inverse effect of communication on autonomy was especially puzzling to the Stanford group, since they considered the task-related communication measure as an approximate indicator of a team-organized instructional pattern and one would expect that the relegation of classroom-related decisions to a group of team members would *reduce* individual autonomy. The report authors devoted a chapter to an inconclusive effort to unravel the puzzle, ending with the possibility that open-space and self-contained teachers systematically differed in the interpretation they applied to the questionnaire items; they proposed that teachers in conventional schools viewed autonomy as freedom from external interference while those in open-space schools viewed it as the ability to control resources necessary for teaching (Meyer and Cohen, 1971, Chap. III).

5. Teacher job satisfaction (X_5) in the Stanford study was found to be a product of classroom autonomy (X_4) and of teacher group influence over school affairs (X_3), operating independently and additively. Task communication (X_2) was unrelated to job satisfaction. Meyer and Cohen reported that school type was also an important contributor to job satisfaction regardless of the other variables controlled. Teachers in open-space schools had greater levels of job satisfaction than their counterparts in self-contained schools irrespective of communication, collegial influence, or autonomy differences between the schools, a fact that the authors thought might be due to a "Hawthorne effect" in the open-space schools (Meyer and Cohen, 1971, pp. 77-78). Pellegrin, too, re-

ported greater job satisfaction in Multi-unit than control schools, although his style of data analysis did not involve eliminating the effects of other variables. In one unpublished analysis, however, he examined the effects of collegial decision making on job satisfaction with negative results; the shift in decision-making power to the collegial group in no way accounted for the differences in satisfaction levels between Multi-unit and control teachers (see Packard, *et al.*, 1973, pp. 31-33).

Several noteworthy points from the Stanford investigation are not reflected by our diagram. We have not depicted interactions among variables, for example, although Meyer and Cohen reported instances in which the relation of two variables appears to hold only in open-space schools. One such instance involved the effect of years of teaching experience (which the authors interpreted as indicating the teacher's ability to command resources or assume a leadership position in the school) on sense of autonomy; while more experienced teachers had higher autonomy scores than inexperienced teachers in open schools, the relationship of experience and autonomy was absent in the control schools.[4] Another instance was more striking, involving the effect of experience on job satisfaction. A direct relationship was observed in open schools but none in self-contained schools. Indeed, the great difference in level of job satisfaction between the school types all but disappeared among the least experienced teachers, and it seems that school reorganization was a benefit only to the more experienced personnel. Further-

[4]This particular interactive effect was not convincing to us in terms of the table displayed by Meyer and Cohen (1971, Table 1, p. 61).

more, the diagram does not indicate the mainly negative findings of the Stanford investigators regarding the influence (better, the attributed influence) of the principal. Although open-space principals were seen to have less influence over the classroom affairs of teachers, and over school-wide affairs as well, his or her attributed influence was not associated with the teacher's level of job satisfaction in either type of school. There was, however, an interactive effect on autonomy; in self-contained schools, but not in open schools, the amount of influence attributed to the principal on the teacher's own classroom inversely affected autonomy scores.

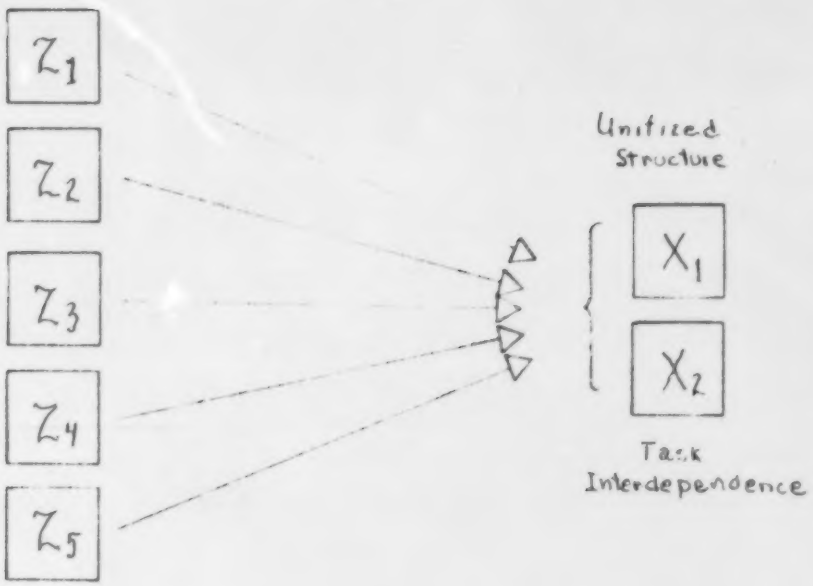
In Chapter I we outlined a number of questions regarding the foregoing model which the MITT Project seeks to answer and we have alluded to some of them again in describing the causal model. One fundamental question that can only be settled by a longitudinal research design concerns the causal ordering of the variables in the diagram. In cross-sectional research it is strictly a matter of assumption that the variables to the right in the diagram are caused by variables to their left. A natural inclination in comparative investigations is to assume that the criterion on which cases (*e.g.*, schools) are chosen for comparison represents the antecedent condition and that the variables measured by the investigators are consequences of the criterion variable, at least in comparative investigations where causal propositions are at issue. Under some circumstances, however, it is equally reasonable to assume that causality flows in the reverse direction.

In respect to the present set of variables, it is plausible to assume that elementary schools vary naturally (or for unexplained reasons) in the collegiality of their control structures, in the degree to which their faculties engage in task-related communication, in teachers' feelings about the power of the collegial group in affecting school affairs, and in teachers' level of job satisfaction. Further, it is reasonable that schools which are "high" on these variables are precisely the ones most likely to establish formal managerial units and/or to create interdependent instructional teams. Schools "low" on these variables, on the other hand--where educational policies are controlled by external agents or by a dominating principal, where teachers are out of touch with one another and feel powerless to affect the course of education, and where they are dissatisfied with their work and careers--may be the least likely to alter successfully their managerial or instructional systems.

In short, the arrows in the diagram leading from school type to the measured variables could reasonably be regarded as pointing in the other direction; the variables previously regarded as endogenous are taken as exogenous, and unitized structure and task interdependence become the endogenous variables of the model. The alternative interpretation is presented in Figure 2, with the symbols for the variables appropriately altered. (According to convention, Z represents exogenous variables and X endogenous variables.)

The interpretation problem of the comparative design can be posed in a slightly different way: how can Pellegrin or Meyer and Cohen (and we) be sure that the schools they investigated did not differ in X_1,

FIGURE 2. Alternative interpretation of the Meyer and Cohen model: reversed direction of causality.



X_2, X_3, X_4, and X_5 *before* the experimental schools changed their managerial and/or work systems? Were the Multi-unit schools or open-space schools initially higher with respect to the measured variables? This way of posing the question differs only in that it does not invoke direct causal connections between the exogenous and endogenous variables of Figure 2. In fact, no causal model is invoked at all; it only asks an empirical question. However posed, the same data answer the question.

The longitudinal design of the MITT Project provides a mean of testing, at least tentatively, the alternative interpretation of the Pellegrin and Meyer and Cohen findings shown in Figure 2. We can determine which of the Project schools that lacked a unitized managerial structure in the spring of 1974 converted to a unit structure in the succeeding fall ("experimentals") and which continued to operate without unit organization ("controls"). We can then examine the relevant variables as measured in the spring to establish whether or not their values were, indeed, "higher" in the experimental than the control schools as required by the alternative model. The test is tentative in that it hinges on two conditions. First, it depends on the experimental schools remaining in the unitized form at least as long as the Pellegrin and Stanford schools had been in their reorganized forms when measurements were taken--seven months in the case of the Pellegrin investigation and one to four years in the case of the Stanford study. Experimental mortality could make the MITT sample noncomparable with those of the other investigators. Second, even were the experimental schools found initially to be "higher" on the relevant variables, the possibility remains

that unitization would subsequently augment the experimental-control differences, thus not controverting the model of Figure 1.

It is necessary to make note of a potentially important circumstance associated with the selection of schools for the MITT Project. We said in Chapter I that, in order to find a sample of schools likely to reorganize within a reasonably brief period of time, we selected schools that had made an *institutional commitment* to reorganization, or more concretely to the implementation of an Individually Guided Education program, shortly before we took our first round of data from them. Among the schools that eventually became experimentals, the process of reaching an institutional commitment covered a period of three of four months, typically beginning in November, 1973, and culminating in late winter or early spring of 1974. We took especial pains to certify that alterations had not been introduced into the operating managerial or instructional systems of the schools prior to our first data collection and, indeed, dropped several schools from consideration where operational changes had been already put into effect.

Nevertheless, it is probable that institutional commitment and the process of reaching it had an effect of its own on certain of the variables under investigation. Almost certainly the faculties of the schools discussed the merits of the innovation program among themselves, and we know that planning sessions and even teacher workshops were held in anticipation of the fall implementation well before our interviews were conducted and questionnaires distributed. Thus, there is a strong possibility that institutional commitment had a quick-acting effect on

such variables as task-related communication, possibly sense of collegial power, and possibly job satisfaction. Meyer and Cohen acknowledged the operation of a "Hawthorne effect" as an alternative explanation for some of their findings--"the tendency of new and exciting innovations to add to the satisfaction of participants simply by virtue of the added gratifications involved in creating and participating in new institutions" (1971, pp. 77-78)--and Pellegrin alluded to the same kind of artifact in his study. Similar mechanisms could be at work to produce differences at Time 1 between MITT's experimental and control schools. Effects attributable to institutional commitment and anticipations of the future innovation cannot be singled out using only the Wave 1 data.

Experimental and Control Schools

In Chapter 1 we reported that 16 elementary schools of the MITT Project formally established managerial units in the fall of 1974, thereby comprising a sample of experimental schools for the study, and that another 13 which clearly lacked unit organization and which otherwise were not implicated in the IGE innovation served as control schools. Here we describe the general characteristics of the two sets of schools and their staffs, attending especially to systematic differences between them, and discuss the operational meaning of the "treatment" variable--unit organization--as manifested in the experimental schools.

General features of the schools and their staffs. The previous chapter described the wide heterogeneity of the schools and school systems involved in Project MITT. While most of the 29 experimental and

control schools that met the demands of the research design were located in public school districts, five were parish schools of a large Roman Catholic diocese. The public school districts were large and small, unified and union, urban and small town, and with and without large central-office staffs or multi-tiered administrative hierarchies. The fact that an effort was made to recruit experimental and control schools from within the same districts meant that, overall, the two sets were essentially alike with respect to district characteristics.

In terms of the characteristics of the schools and their staffs, heterogeneity also prevailed among the 29 schools, but since it was impossible in the course of the selection process to match schools within districts on size, grade-level coverage, staff experience, or other salient characteristics, systematic differences could arise between the group of experimental and the group of control schools. Below we document the more significant of the comparisons for which we have information either from the spring or the fall of 1974.

Possibly the most important difference between the sets of schools lies in their grade-level coverage. It is clear from the descriptions in Chapter II that the MITT sample was far more variegated in grade organization than might be imagined as the "standard" K-6 or K-8 elementary-school pattern. Table 1 displays the coverage of experimental and control school, along with information regarding other school attributes. The point to note in the table is that five of the experimentals were essentially "primary" schools, covering only the first three or four grades, and another experimental was a "middle" school, albeit housing a

TABLE 1: Attributes of MITT Experimental and Control Schools, Fall 1974.

	EXPERIMENTAL					CONTROL				
District	School Code	Grade Levels	Enroll-ment	No. of Teachers	No. of Aides	School Code	Grade Levels	Enroll-ment	No. of Teachers	No. of Aides
01						02	K-6	507	21	6
03	06	1-4	642	27	1					
04	07	1-4	657	27	5					
05	08	K-3	302	10	7	12	K-6	772	29	9
	09	K-6	459	20	10					
	10	K-3	206	9	6					
	11	K,4-6	351	11	2					
06	13	1-3	297	12	1	14	1-3	213	8	1
07	15	K-5	245	10	2	16	K-5	329	12	3
08	17	K-8	315	9	2	21	K-8	615	19	-
	18	K-8	736	24	-	22	1-8	595	19	-
	19	K-8	223	9	-					
09	34	K-6	557	18	2	35	K-6	591	20	3
11						29	K-4	327	14	7
						30	K-6	247	10	5
12	33	K-6	621	24	1	31	K-5	352	13	2
14	38	1-8	357	12	1	39	1-8	207	8	-
15	40	1-6	277	11	6	41	K-6	278	10	2
16	42	1-6	626	23	-	43	1-6	662	21	-
Mean			429.5	16.0	2.8			438.1	15.7	2.9

kindergarten at the same time; only two of the control schools were similarly specialized (Schools 14 and 29). The sets did not differ importantly according to their inclusions of a kindergarten program nor of the seventh and eighth grades.

Nor did the sets differ in size, as determined by pupil enrollment, in number of classroom teachers, or in number of paraprofessional aides, although the schools within each set differed profoundly in all three respects. Other evidence not shown in the table indicates that the experimentals and controls were essentially alike in the number of subject-area teachers and non-teaching specialists. (The information in Table 1 is for the fall of 1974; the schools did not change significantly from spring to fall, of course, in any of these regards.)

Tabulations of the spring 1974 teacher questionnaires revealed several notable differences, as well as similarities, in attributes of the staffs. Most important was the fact that teachers in the experimental schools were younger and less experienced on the average than their counterparts in the control schools, a difference, incidentally, that parallels the observation of Meyer and Cohen (1971, p. 17) concerning their open-space *vs.* self-contained schools. At the same time, there were no appreciable differences between the sets of schools in educational attainment, length of tenure in the present school, nor in sex distribution (8 percent males in each). The data are reported in Table 2.

Several scales were included in the MITT Project questionnaire to measure teachers' basic conceptions of the educative process, and again the tabulations revealed differences and similarities in the orien-

TABLE 2: Attributes of Teaching Staffs in MITT Experimental and Control Schools, Spring 1974.

Attribute	EXPERIMENTAL N = 228	CONTROL N = 177
Sex, Percent male	8%	8%
Age	%	%
20-24 years old	20	18
25-29	30	18
30-34	14	14
35-39	8	12
40-44	9	10
45-49	5	8
50-54	6	8
55-59	4	6
60-64	3	5
65 and older	1	1
	100%	100%
Education Attainment	%	%
Less than Bachelor's degree	2	4
Bachelor's	27	29
Bachelor's plus credits	54	44
Master's	12	14
Master's plus credits	5	9
	100%	100%
Length of Teaching Experience		
1 year	7	8
2-3 years	24	16
4-5	16	14
6-7	10	9
8-9	8	7
10-14	11	13
15-19	7	10
20-29	9	12
30 or more years	8	11
	100%	100%
Mean*	10.6 years	11.9 years

TABLE 2. (Continued)

Attribute	EXPERIMENTAL	CONTROL
Length of Tenure in School	%	%
1 year	28	23
2-3 years	28	30
4-5	16	14
6-7	9	8
8-9	2	8
10-14	8	9
15-19	4	2
20-29	4	5
30 or more years	1	1
	100%	100%
Mean*	5.6 years	5.7 years

*Means computed from ungrouped data.

tations of the staffs. (These scales are described in Wehling and Charters, 1969.) The calculations in Table 3 indicate that teachers in the control schools, on the average, were stronger in their beliefs concerning the importance of subject matter and of classroom order in structuring the learning process and less inclined to stress a personal adjustment view of education than the experimental school teachers.[5] They were essentially alike in their views of the balance between student autonomy and teacher directiveness in classroom operations and beliefs in the instrumentality of giving consideration to pupil interests and feelings.

Apparently, some selection process, either accidental or systematic, was at work that differentiated staffs of the two sets of schools with regard to age, experience, and certain aspects of outlook on the educative process. On many other potentially biasing attributes, however, experimental and control schools were virtually identical.

Managerial structure of the schools. The feature that explicitly distinguished experimental from control schools in the MITT study was the formal organization of the teaching faculties into units, or "teams", at the beginning of school in the fall of 1974. As discussed previously, it was also essential to certify that the reorganization was a *bona fide* change--that the schools had not had a unitized structure in

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[5]Although the differences in these three means are statistically significant, or nearly so, by a t test, the relationship is a weak one, as estimated by ω^2 (Hays, 1373). School type accounts for less than 1 percent of the variance in belief scores.

TABLE 3: Teacher beliefs about the Educative Process in Experimental and Control Schools: Spring 1974.

Scale	EXPERIMENTAL Mean	S.D.	(N)	CONTROL Mean	S.D.	(N)	Difference in Means*
Subject-Matter Emphasis	3.29	.79	(202)	3.42	.82	(158)	-.13
Personal Adjustment Ideology	4.85	.61	(216)	4.71	.65	(165)	+.14
Student Autonomy-Teacher Directiveness	3.04	.67	(203)	2.98	.70	(162)	+.06
Pupil Consideration	4.36	.71	(219)	4.34	.75	(164)	+.02
Classroom Order	3.31	.81	(212)	3.47	.82	(168)	-.16

*Minus sign indicates experimental mean lower than control mean. Scores range from low of 1.0 to high of 6.0. In the case of the Student Autonomy-Teacher Directiveness scale, a high value indicates strong belief in Student Autonomy.

the previous year or a structure that was the functional equivalent of unitization. In the case of the control schools, it similarly was necessary to assure that they had a conventional managerial structure in the spring and that it remained conventional in the succeeding fall. Chapter I reported the procedures and problems of making these determinations and indicated that a number of schools from which data were taken in the spring failed to qualify as either experimentals or controls. At this point we must add some observations regarding the so-called conventional managerial organization and regarding particulars of the changes that occurred in experimental schools in order to clarify insofar as possible the dimensions of variation.

The conventional managerial structure of elementary schools is a simple one, typically implicating only two formal positions--teacher and principal. (While some small schools of the nation assign administrative duties to one of the regular classroom teachers, all schools in the MITT sample had full-time principals.) In larger schools the principal may be augmented in his or her duties by an assistant principal, either a part-time appointment of a classroom teacher or a full-time administrative officer, and such was the case in five of the MITT schools, but the assistant principalship is rarely a line position. No formal positions intercede between the principal and individual teachers.

Conventionally, the only formal bodies in the elementary school are *ad hoc* committees and the collective teaching faculty. The latter, lacking officers, assembles periodically at the pleasure of the principal and typically plays little or no role in educational management or

governance, depending however on the principal's participatory leadership style. One of the MITT schools (a control school) had established a faculty advisory council that met regularly with the principal, a product of negotiations with the local teachers's association, but such bodies apparently are uncommon in conventional schools. Some schools go in heavily for teacher committees. The extent of committee formation varied dramatically from school to school in the MITT sample. The majority had no intra-school committees at all (as distinct from district-wide committees and those involving parents), while the minority usually had three, four, or five, and in one case ten, more or less active committees. They normally were organized around curriculum areas and special school functions (Math Study, Reading Evaluation, Art, Safety, Report Cards) and sometimes served mainly an in-service training purpose. Some large urban elementary schools of the nation have grade-level committees, encompassing all teachers at the same grade level and usually with chairmen, but no such schools were among the MITT sample. (Had any appeared, it would have been dropped from the sample on grounds that the organizational form is functionally equivalent to unitization.)

In the spring of 1974 all of the experimental and control schools displayed the conventional managerial structure described above. The school-to-school variations, such as the presence or absence of an assistant principal or the extent of committee formation, did not produce systematic differences between the two sets of schools. The change in structure that occurred among experimental schools in the fall centered on three features: the creation of units, of unit leader positions, and

of an Instructional Improvement Committee, or IIC.[6]

At least two formal units were established in each experimental school that encompassed most, if not all, regular classroom teachers. The number of units ranged up to six, depending primarily on the total number of teachers in the school. Generally, the units consisted of no more than five or six teachers and no fewer than three. Depending on the grade-level coverage of the school as well as size, membership might be confined to teachers of the same grade level or it might consist of teachers spanning up to four grade levels; considerable variation occurred on this count. In a few schools a separate unit was formed for specialists, and in others certain specialists were assigned as resource personnel to particular units, but typically specialists and subject-area teachers were not implicated in the unit organization. Virtually all units were scheduled to meet at least once or twice weekly, typically, but not universally, at times set aside during the regular working day.

All experimental schools created the position of unit leader in each of the units. Chiefly, the position was appointive, but in five schools the choice of leader was left to unit members. Rarely was an award associated with the position. Only two schools attached a salary increment to the job and three schools provided released time to the unit leader.

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[6] IIC is the language of the Individually Guided Education movement. Although local designations of the cabinet of unit leaders and principal may differ, we will retain the language in this chapter.

IIC's, the council consisting of unit leaders and the principal, were formed in all but one of the experimental schools. The schedule of meetings, as we determined early in the school year, was once or twice weekly in the majority of schools, once or twice a month in five schools, and irregular in two.

The details of these changes in the experimental schools are shown in Table 4. Although the supporting arrangements were not universally strong, there is a clear structural difference between Time 1 and Time 2 in the experimental schools and between them and their controls in the fall of 1974. How these structural elements were activated--how the units, unit leaders, and ICC's assumed responsibilities, exercised managerial and governance functions, and otherwise performed--is a matter yet to be determined.

Measured Variables Before Unit Organization

Task Interdependence. It should be clear that the presence or absence of a "team teaching" instructional organization was not a criterion in the MITT study for defining schools as experimental or control. Rather, the instructional organization--specifically, the extent of task interdependence among classroom teachers--was measured at Time 1 (spring, 1974) and will continue to be measured at subsequent time points in the study.

The conceptual basis and operational procedures for the measure of task interdependence are described in detail in Appendix A of this report and will not be repeated here. Two levels of task interdependence

TABLE 4: Units, Unit Leaders, and IIC's in Sixteen MITT Experimental Schools, Fall 1974

School Code	No. of units	Teachers per unit	Official leaders	Extra pay, leaders (1)	Released time, leaders (2)	Leader Selection (3)	Schedule of unit meetings (4)	Unit meetings in working day	IIC	Schedule of IIC meetings (4)
6	6	4.5	yes	no	no	P-T	1-2 wk	yes	yes	irreg.
7	6	4.3	yes	no	no	T	1-2 wk	yes	yes	1-2 wk
8	2	3.5	yes	no	no	P	1-2 wk	no	yes	1-2 mo.
9	6	3.3	yes	no	no	P	1-2 wk	no	yes	1 wk
10	2	4.5	yes	no	1:15	P	1-2 wk	?	yes	1 wk
11	4	4.0	yes	no	no	vol.	1-2 mo.	no	yes	1 wk
13	3	4.3	yes	$300	no	P	1-2 wk	yes	yes	1 wk
15	3	3.3	yes	no	no	P-T	1-2 wk	yes	yes	1-2 mo.
17	2	5.0	yes	no	yes	T	1-2 wk	yes	yes	1 wk
18	4	4.5	yes	no	no	T	1-2 wk	no	yes	1-2 wk
19	2	4.0	yes	no	no	T	1-2 wk	yes	yes	irreg.
33	7	3.4	yes	no	no	T	1-2 wk	yes	no	--
34	6	3.0	yes	no	no	P-T	1-2 mo.	yes	yes	1-2 mo.
38	3	4.3	yes	no	no	P	1-2 wk	yes	yes	1-2 mo.
40	3	4.3	yes	$270	2:00	P	1-2 wk	yes	yes	1-2 wk
42	6	3.8	yes	no	no	P-T	1-2 wk	yes	yes	1-2 mo.

(1) Annual rate.
(2) Hours per week.
(3) P, principal; T, team members; vol., volunteers.
(4) Times weekly or monthly.

were distinguished for measurement (a) *throughput interdependence*, representing instances in which a pair of classroom teachers taught different subjects to the same pupils (at least two) during a two-week interval; (b) *instructional interdependence*, representing instances in which a pair not only taught the same pupils but taught them in the same subject area. A third alternative, of course, was the absence of interdependence of either kind. Information on which the measurement was based came from booklets in which teachers logged their daily teaching contacts with a sample of pupils over ten consecutive school days.

While the data allow detailed analyses of interdependence patterns among subsets of teachers in the school, our present purpose of comparing experimental and control schools with respect to the incidence of interdependent relationships can be served by a simple procedure. A count is made of the number of pairs of teachers in a school who are linked by throughput interdependence (p_t) or by instructional interdependence (p_i) and an index is formed by dividing each count by twice the number of teachers furnishing information (n). Thus,

$$TPI = p_t/2n$$

$$INI = p_i/2n$$

where TPI and INI are the indexes of throughput and instructional interdependence respectively. An index value of 1.00 would be equivalent to the case of a ten-teacher school, say, in which teachers formed into teams of five and every teacher were linked to every other teacher on the team. In principle, index values can exceed 1.00, but the practicalities

of instructional programs in schools made such high values unlikely.

In Table 5 we report the TPI and INI indexes for each experimental and control school, along with the numbers of reporting teachers. Overall, 90 percent of the regular classroom teachers furnished logs, but no data were received from School 8 and estimates of task interdependence could not be reached for it.[7] The point of immediate interest is that experimental and control schools did not differ significantly at Time 1 either with respect to throughput interdependence or instructional interdependence, as demonstrated by the *t* test at the table's bottom. Experimental schools were no more likely than the controls to have a "team" form of instructional organization prior to the managerial reorganization.

In passing, we should remark on the surprising extent of task interdependence in these supposedly conventional elementary schools. The image of the "standard" instructional organization usually invoked in the literature on team teaching and other innovative plans--the pattern from which the innovation is said to be a departure--is that of the self-contained classroom, where each teacher teaches only his own students independently of, and in isolation from, other teachers in the school. Yet, among these 28 schools, only one, School 35, completely fit the stereotype. In all the rest there were at least one or two

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[7] Logs were not systematically obtained from seventh- and eighth-grade teachers during the data collection of spring 1974, in part because some experimental schools had not expected to include the upper grades in the IGE implementation plan. Subsequently, though, only one experimental school excluded the upper grades from unit organization.

TABLE 5: Task Interdependence, MITT Experimental and Control Schools, Spring 1974

	EXPERIMENTAL				CONTROL			
District	School Code	TPI	INI	No. of Teachers	School Code	TPI	INI	No. of Teachers
01					02	.40	.12	21
03	06	.10	.10	15				
04	07	.14	0	22				
05	08	-	-	-	12	.02	.02	26
	09	.05	.02	20				
	10	.17	.28	9				
	11	.23	.09	11				
06	13	.04	0	12	14	0	.11	9
07	15	.05	.25	10	16	.14	0	11
08	17	.33	.11	9	21	.31	0	13
	18	.44	0	18	22	.29	.04	12
	19	.07	0	7				
09	34	.04	0	12	35	0	0	17
11					29	.29	0	12
					30	0	.15	10
12	33	.33	.05	21	31	.04	.12	13
14	38	.06	.06	8	39	.08	0	6
15	40	.23	.05	11	41	.15	.05	10
16	42	.17	0	18	43	.09	0	17
Mean		.163	.067			.139	.047	
S.D.		.126	.089			.139	.057	

t test of means	diff.	t	df	p	ω^2
TPI	.024	.48	26	-	-
INI	.020	.71	26	-	-

pairs of teachers, often considerably more, who had worked out some form of pupil exchange between them. By one of our counts, the teachers *without* interdependence links with other classroom teachers during the two-week time sample were distinctly in the minority (45 percent), and our data do not take account of linkages with subject-area teachers of music, physical education, and the like or other teaching specialists in the school.

Generally, the interdependence relationships were small two-teacher systems of exchange, but occasionally they implicated three or more teachers; the majority of the systems were confined to teachers of the same grade level. Usually they were scattered across the school rather than characterizing a particular sector of the school. The pattern of incidence suggests that the relationships were emergent phenomena, worked out voluntarily among compatible teachers who found the exchanges to be a means of solving instructional problems or enhancing their common educational goals. In no sense could task interdependence be regarded as a systemic characteristic of the *school*--at least not prior to unitization and the implementation of IGE.

Throughput interdependence (TPI) is the more common of the two types of task interdependence by a large margin. It represents a division of instructional labor by subject matter--either in a departmentalized form with teachers specializing in particular subjects or in a rotational pattern without teacher specialization. Instructional interdependence (INI)--the more intimate type of collaboration that

begins to approximate "team teaching" in the restrictive sense of that term--is comparatively rare. None of the experimental schools (nor control schools, for that matter) comes close to having a "team teaching" work system in this pre-unitization period. School 10, a small K-3 school with nine teachers, had the highest index value (.28), implying that five pairs of teachers taught pupils "together" (*i.e.*, taught them the same subjects during the two-week interval); 18 pairs would have to be observed to say that the school had something akin to a "teaming" instructional organization.

The difficulty of characterizing *schools* in terms of instructional organization and the fact that none of the experimental schools in the MITT sample can be called "team teaching" schools has a bearing on our capability of testing fully the alternative interpretation of the earlier Figure 2 at this point in time. Should it turn out that all, or some, of the experimental schools convert to a "team" work system in the fall of 1974--that the unitized schools have INI indexes close to 1.00 in the second round of measurement--the full test of the alternative hypothesis can be made. The measured scores from the second data-taking wave, though, are not yet available. In the following sections, we compare schools varying only with respect to one of the presumably joint variables, unitization.

Collegial control structure. The MITT procedure for measuring the control structure relating to basic educational decisions in the elementary schools is described in Appendix A. Briefly, informants in each school provided interviewers with detailed accounts of how decisions were

reached in regard to the assignment of teachers to instructional groups, subjects to be taught and when taught, teaching methods to be used, instructional materials to be purchased and used in classrooms, how pupil progress was to be reported and discipline administered. The accounts described whether the issue at hand was left to the discretion of individual teachers or whether it was governed by an organizational decision; if the latter, informants reported on who was implicated in making the decision (the input population) and which teachers were expected to be affected by it (the output population).

A coding procedure was developed allocating decisions to one of several decision types in terms of the joint characteristics of the input and output populations. Thus, if the only members of the input population, *i.e.*, those who made the decision, were the teachers governed by the decision, the decision type was termed "collegial." If, however, members of the input population consisted of the principal or supervisors in addition the affected teacher(s), it was called "shared." If no affected teachers were involved in making the decision, it was considered a "removed" decision. The basic information can be assembled to create other types as well.

The initial tabulations of the spring 1974 data, given in Appendix B, Tables 2 and 3, permit a rough comparison of experimental and control schools. Here we need extend the analysis only slightly in order to focus on the degree of collegiality in the schools and to present tabulations on a school-by-school basis, as shown in Table 6.

For that purpose, we have made some adjustments and minor modifications in analysis procedures, so the data are not exactly comparable to those in Appendix B. In particular, informants' reports on decisions have been reduced to a per-informant base, since the number of knowledgeable persons who were interviewed varied from school to school, and, in the case of reports on decisions regarding subjects to be taught, the data were reduced to a per-subject base as well. The latter modification was made because of the substantial variation in the number of subject areas for which informants could furnish accurate descriptions of the decision process. Additionally, the present tabulations delete several sub-categories of the task areas about which the informants were questioned, since extremely small numbers of reports were given about them; these were areas dealing primarily with prohibitions--subjects asked not to teach, materials asked not to use, and so on.

To derive a quantitative expression for the variable degree of collegiality, we combined and reconstituted the decision types into one in which every member of the input population was a teacher. In effect, this entailed combining the types called "collegial" and "leader determined", where members of the input population are also members of the output population, and subdividing the "shared" type to distinquish instances in which the outside participants in the decision (*i.e.*, persons not affected by the decision) were teachers rather than administrators or supervisors. The number of decisions (per-informant) of this general variety, then, served as the measure of the collegiality of the school's control structure. The numbers were aggregated over all task areas

instead of aggregating them separately for classroom and for school affairs, as the appendix reports, in order to simplify the presentation of data.

In general about one-third of the issues on which informants were questioned did not involve organizational decisions at all but were left to the discretion of individual teachers. Experimental and control schools did not differ importantly in this respect.

Of the issues which were subjects of organizational decision, about 20 percent were of the general collegial variety described above. Table 6 shows the number of collegial decisions and total decisions in each experimental and control school.

The figures indicate somewhat greater collegiality in educational governance systems of experimental than control schools. The difference is small statistically speaking, with a probability level of 17 percent by the two-tailed t test summarized at the foot of the table. School type accounts for about three percent of the variance in collegiality scores ($\omega^2 = .032$). The fact that the total number of decisions is slightly smaller in the experimental than control schools (14.1 and 15.2 respectively) tends to magnify the differences in percent values.

Task-related communication. The procedure for measuring communication among school faculties was described earlier, in Chapter 1. In essence, the procedure was sociometriclike, asking teachers about the frequency of their conversations with other persons on three kinds

TABLE 6: Collegiality of Organizational Control Structure, MITT Experimental and Control Schools, Spring 1974.

(Number of decisions per informant)

	EXPERIMENTAL			CONTROL		
District	School Code	Collegial Decisions	Total Decisions	School Code	Collegial Decisions	Total Decisions
01				02	2.5	15.0
03	06	5.3	15.3			
04	07	4.8	13.3			
05	08	6.7	18.6	12	.8	12.1
	09	3.0	9.8			
	10	5.3	16.2			
	11	3.8	10.5			
06	13	1.6	9.8	14	1.0	11.2
07	15	1.3	17.0	16	3.4	19.3
08	17	2.1	13.3	21	2.8	17.7
	18	2.2	12.6	22	5.4	22.7
	19	6.2	22.4			
09	34	2.2	16.1	35	3.8	17.7
11				29	2.8	15.3
				30	1.2	13.4
12	33	2.5	16.6	31	3.2	15.9
14	38	1.0	9.9	39	.6	13.5
15	40	4.0	10.7	41	5.2	13.6
16	42	4.1	13.4	43	1.6	10.0
Mean		3.51	14.09		2.63	15.18
S.D.		1.777	3.614		1.574	3.510

t test of means	diff	t	df	p	ω^2
Collegiality	.88	1.39	27	.17	.032
Total Decisions	1.09	.81	27	-	-

of topic: classroom, schoolwide, and nonwork. Scores are derived for each teacher (on each topic) reflecting the *extensity* of his communication, *i.e.*, the number of persons with whom s/he talks on the topic, and the *intensity* of communication on the topic, *i.e.*, the average frequency of his or her conversations per communicant.[8]

For the present analysis we have based the scoring on verified reports of communication, or, in the language of sociometry, reciprocated nominations. To receive a score greater than zero, two teachers must each list the other as a person with whom they talk on a given topic. (They had been asked to list only those with whom they talked at least once or twice a month.) They need not agree precisely on the frequency of their conversations beyond this minimal level in order to be scored. Scores were assigned according to the following scheme:

		Report of Teacher 2				
		At least daily	Several times weekly	Once a week	Once or twice a month	No nomination
Report of Teacher 1	At least daily	5	2	1	1	0
	Several times weekly	2	2	1	1	0
	Once a week	1	1	1	1	0
	Once or twice a month	1	1	1	1	0
	No nomination	0	0	0	0	0

[8] A *volume* score can also be derived but will not be used here. See Chapter 3.

If both Teacher 1 and Teacher 2 nominate one another and they agree that they talk at least daily, both are scored 5. On the other hand, if Teacher 1 reports a conversation of "at least daily" while Teacher 2 says their conversations occur "several times weekly", both are given scores of 2. Other scores are derived similarly.

Mean intensity and extensity scores for task-related communication (classroom topics) are given for each school in Table 7, and the means of these school means are compared for experimental and control schools in Table 8.[9] Also, the same comparisons are shown for communication about school and nonwork topics, although the school-by-school scores are not presented for them.

The principle observation to be made in Table 7 is the great school-to-school variations that occurred both in regard to the number of others with whom the average teacher communicated, ranging from less than two fellow teachers to more than six, and in regard to the average teacher's intensity of communication with others, ranging from about twice a week (a value of 2.0) to nearly four times a week (a value of 4.0). These school variations are even greater for the extensity of school and nonwork communication, as indicated by the magnitude of the standard

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[9]The communication data represent a relational property between teachers rather than an individual attribute. Strictly speaking, scores should not be assigned to individual teachers but to pairs of teachers, and aggregations to the school level should be made over the pairs. For the present purpose of experimental-control comparisons, it has been more convenient to analyze the data as individual attributes, and given the near absence of differences, no distortions are introduced.

TABLE 7: Extensity and Intensity of Communication on Classroom Topics, MITT Experimental and Control Schools, Spring 1974

	EXPERIMENTAL			CONTROL		
District	School Code	Extensity	Intensity	School Code	Extensity	Intensity
01				02	1.82	2.37
03	06	5.36	3.27			
04	07	2.21	2.36			
05	08	6.50	2.22	12	2.15	1.86
	09	3.18	2.17			
	10	6.56	2.49			
	11	5.45	2.14			
06	13	3.67	2.30	14	4.22	3.04
07	15	2.60	2.05	16	2.73	2.48
08						
08	17	4.67	2.45	21	1.82	1.86
	18	2.43	2.23	22	2.57	3.03
	19	3.11	3.53			
	20	4.31	1.27			
09	34	1.43	2.29	35	4.75	2.20
11				29	1.46	1.58
				30	2.00	2.77
12	33	2.64	2.57	31	2.00	2.89
14	38	3.69	2.18	39	4.29	2.45
15	40	2.18	3.03	41	3.60	2.24
16	42	1.94	3.44	43	1.64	2.43
Mean		3.60	2.54		2.70	2.41
S.D.		1.632	.489		1.131	.444

TABLE 8: Comparisons of Extensity and Intensity of Communication on Classroom, School, and Nonwork Topics between MITT Experimental and Control Schools, Spring 1974

Topic and Measure	Experimental N=16	Control N=13	Diff.	t	p	ω^2
CLASSROOM						
Extensity						
Mean	3.60	2.70	.90	1.69	.10	.060
S.D.	1.632	1.131				
Intensity						
Mean	2.54	2.41	.13	.78	-	-
S.D.	.489	.444				
SCHOOL						
Extensity						
Mean	4.14	3.85	.29	.39	-	-
S.D.	1.992	1.951				
Intensity						
Mean	2.03	2.04	.01	.02	-	-
S.D.	.531	.530				
NONWORK						
Extensity						
Mean	3.61	3.37	.24	.30	-	-
S.D.	2.235	2.146				
Intensity						
Mean	2.39	2.11	.28	1.31	.20	.024
S.D.	.540	.630				

deviations in Table 8. At the same time, the experimental and control schools, as groups, were similar with respect to the several communication measures. Experimental schools seemed to be slightly higher in the extensity of communication on classroom matters and in the intensity of communication on nonwork matters. While the differences were not statistically significant, in the case of extensity of classroom communication the difference accounted for six percent of the variance in school scores as measured by ω^2 (and less than three percent in the case of intensity of nonwork communication).

Thus, there is a hint that the experimental schools had a head start on the control schools in extensity of task-related communication prior to managerial reorganization. It is possible, of course, that the difference was because of events following the institutional commitment of the schools to the IGE innovation, not a more enduring characteristic of the faculties.

Sense of collegial power. To measure the teacher's feelings regarding the power of colleagues in the school, the MITT staff used two measures without modification from the Stanford investigation--attributions of influence to teacher committees and groups (Sense of Collegial Power - Group) and to individual teachers (Sense of Collegial Power - Individuals). While the Meyer and Cohen report (1971) had shown few analyses involving the latter measure, we retained both on grounds that the first might be unduly biased against schools in which few committees, groups, or, especially, units existed. Table 9 reports the

TABLE 9: Comparisons of Subjective Attributes of Teachers In MITT Experimental and Control Schools, Spring 1974

Attribute	Experimental	Control	Diff.	t	p	ω^2
Sense of Collegial Power - Groups						
Mean	2.95	3.13	.18	1.91	.06	.007
S.D.	.913	.855				
N*	213	165				
Sense of Collegial Power - Individuals						
Mean	3.20	3.27	.07	.90	-	-
S.D.	.831	.700				
N	216	167				
Sense of Autonomy in Work - MITT						
Mean	4.66	4.80	.14	2.49	<.02	.013
S.D.	.595	.518				
N	220	168				
Index of Autonomy - Stanford						
Mean	3.90	3.96	.06	1.10	-	-
S.D.	.642	.554				
N	218	170				
Job-Career Satisfaction - Stanford						
Mean	17.72	18.18	.46	1.35	-	-
S.D.	3.614	2.974				
N	217	168				
Work Satisfaction - Pellegrin						
Mean	3.20	3.30	.10	2.72	<.01	.016
S.D.	.362	.296				
N	205	167				

*Variation in N's is due to non-responses.

comparative data for experimental and control schools, aggregated over all teachers in schools of the type.

A statistically significant difference appears between experimental and control schools in the attribution of power to teacher groups but not to individual teachers. By a t test, the probability level is .06, with 376 degrees of freedom. The association between school type and the collegial power measure, however, is very weak: $\omega^2 = .007$. In any event, it is teachers in the control schools who are higher in Sense of Collegial Power - Group, not those in the experimental schools. Clearly, it cannot be said that experimental school teachers were higher on this variable before unit organization.

Sense of autonomy in work. Findings about teacher sense of work autonomy were similar to those for Sense of Collegial Power - Group; teachers in the control schools were significantly higher (beyond the .02 level) than experimental school teachers. The strength of the association was somewhat greater for this measure, but school type still accounted for less than two percent of the variance ($\omega^2 = .013$).

Since the Stanford group's indicator of teacher autonomy was included in the MITT questionnaire, comparisons could be made for this measure too. While there was a slightly higher mean among control teachers, the experimental-control difference did not even approach statistical significance by the t test. These two sets of data are also reported in Table 9.

Job satisfaction. The difference between experimental and control teachers on the Stanford measure of Job-Career Satisfaction,

shown in Table 9, was a nonsignificant one. In that regard, the two types of schools were alike. The higher scores of control school teachers on the Pellegrin measure (Work Satisfaction), however, did reach statistical significance. The estimate of association was small, though ($\omega^2 = .016$).

Discussion

The evidence adduced above comparing experimental and control schools in the spring of 1974, the school year preceding the year in which units were formed in the experimental schools, does not allow one to argue at this point that the differences reported by the Stanford investigators, or by Pellegrin, were "already there" before the innovation had been introduced. True, our data on the collegiality of the school's governance system indicates that the experimental schools were somewhat more collegial than the control schools, but the earlier investigators, especially the Stanford group, did not measure the school's control structure as we did and had no comparable differences to report. True, too, we observed greater task-related communication in experimental than control schools in the spring of 1974; this might have been a transient phenomenon associated with institutional commitment--teacher workshops and group planning meetings in anticipation of the fall reorganization--but we cannot determine this at the present time. While the differences on these two variables were not great, the edge that the experimental schools had over the control schools with respect to them will need to be taken into account in MITT's subsequent longitudinal analyses.

Concerning the other variables that were directly, or closely, comparable to the ones measured by Pellegrin and by Meyer and Cohen, however, our data show either no experimental-control differences or small differences in a direction opposite to that required by the alternative hypothesis. Thus, teachers were alike in Sense of Collegial Power - Individuals, in the sense of autonomy measure used by Meyer and Cohen, and in their measure of Job-Career Satisfaction, and teachers in control schools were slightly *higher* than their counterparts in experimental schools in Sense of Collegial Power - Group, in Sense of Autonomy in Work (MITT's scale), and Work Satisfaction (Pellegrin's measure).

No important differences were observed in the first-wave data between experimental and control schools with respect to task interdependence, the instructional interdependence (INI) type, in particular. In the absence of measures from the second wave of data collection, yet to be analyzed, the variable formed by the *joint* presence of unitization and "team" organization of the work system--Variables X_1 and X_2 in Figure 2--cannot be constructed. Thus, the alternative model of Figure 2 cannot be fully specified. We have doubts that a "team teaching" work system can be instituted by fiat in the same way that the managerial structure can be established and doubts that schools can be characterized *qua* schools as either with or without a "team" instructional organization; even in the so-called conventional schools of the MITT study, "teaming" operations could be observed of at least an incipient variety, apparently depending on the initiative of the implicated teachers; but the resolution of the doubts requires subsequent

analysis.

Meanwhile, we can say that there was no strong and consistent inclination for the experimental schools to exceed the control schools in a way supporting the contention that what the earlier investigators had regarded as cause was, in fact, effect and what they took as effect was actually cause. At this point in the MITT investigation, the causal model displayed in Figure 2 is not supported (recognizing that only the unitization factor is at stake); that of Figure 1 is still the better interpretation. We pointed out earlier that a definitive test of the alternative interpretation must await the future. If some of the experimental schools do not survive the transition period, for instance, and revert to a conventional form within a year or two, and if such schools were systematically low on the relevant variables, the alternative interpretation of Figure 2 would be viable.

The data presented in this chapter harbor a number of observations and unexplored questions. For one thing, we have been impressed by the great variability of the individual schools on the measures we have taken. Only a few of our tables in the chapter report scores school by school, but our more detailed data reveal much the same heterogeneity. Most of the analyses we have made so far indicate an important "school effect." The variability resulting from still-to-be-established attributes is sufficiently great as to obscure effects that might be associated with the experimental-control distinction. Clearly, there are questions to be answered concerning the determinants of the variation on such measures as collegiality of control structure, instructional organization,

or sense of autonomy--determinants that may lie in characteristics of the teachers employed by the school or in attributes of the school's organization or setting.

We have been piqued, too, by some of the differences observed between experimental and control schools in the first-wave data, especially by the comparatively low scores on sense of collegial power among teachers in the experimental schools. We have wondered whether, in the process of institutional commitment, they came to believe that the IGE innovation had been imposed on the school by administrators or outside parties without significant input by the teaching faculty. Evidence discussed in Chapter V indicates that the innovation did, indeed, originate outside the school faculty in all of the experimental schools; at the same time, there were only a few schools in which most teachers were not supportive of the innovation program and an even smaller number in which pockets of outright opposition could be discerned. The limited explorations we have undertaken to date do not suggest this to be a promising lead.

CHAPTER V

A Companion Study: Predicting Task Interdependence

As described in the preceding chapters, the prime study is set to observe governance, instructional and attitude changes that obtain with the introduction of the formal unit organization. The companion study has been launched using perspectives taken from studies of planned and emergent change in schools. It attempts to predict on the basis of data collected before and during the initial installation phase, differential increases in task interdependence in schools that opted to implement a formal unit organization. Task interdependence, which is fully described in Chapter IV and Appendix A, best characterizes the instructional change promised by the unit organization. This change is often called teaming or team teaching and we shall use these terms interchangeably throughout this chapter.

The companion study is divided into two major segments. Since team teaching is most apt to occur between and among teachers on the same unit, the first goal of the companion study is to predict which schools will be most successful in installing units. Because units are not necessarily sufficient to stimulate team teaching, the second part of the companion study is sensitive to factors that, in addition to the presence of units, may also stimulate team teaching.

The prediction of successful planned change is not as well informed by theory as, say, the prediction of differences in teacher attitudes in various school settings. Thus the companion study is eclectic. It draws from a number of sources which estimate the ability of schools to install educational

innovations. These sources are sufficiently robust in their entirety to suggest a number of potentially fruitful areas for investigation. Such areas or factors have been brought to bear on the problem of predicting the installation of the unit organization--the only clear change to which the experimental schools have committed themselves.

The reader should be mindful that the chapter reports on our initial efforts to identify, measure and score schools on variables that seem to be directly and indirectly associated with team teaching. Advanced, therefore, are predictions which will not be tested and whose tests will not be reported until after subsequent data on task interdependence is in and analyzed. Another important detail also deserves comment. In the spring of 1974, 17 schools had made an institutional commitment to install units. Discussion, thus, is built around 17 and not 16 experimental schools as described in the previous chapters. This fact points to a further limit to the predictions. The study is blind to events following the early points when data were collected. In this case, for example, the seventeenth school discontinued efforts to install the unit organization for reasons which might have become apparent if data had been collected throughout the installation period.

Factors Related to the Installation of Units. A number of reports of the implementation of educational innovations and various popular implementation strategies lead to the following general conclusions. In order to install new patterns of behavior in schools, those whose actions will be most centrally implicated must participate in the decision to adopt and play a strong role also in determining the ultimate shape of the innovation in the school (Lighthall,

1973). Also, there must be opportunities for the ultimate practitioners, or users (Fullan, 1972) of the innovation to learn well its form and its implications in operation. These opportunities may include inservice training, access to consultants, risk free experimental trials, and feedback or cybernetic evaluation systems that permit introspection and adjustment. Also, as it is often the case that alterations in one part of the system necessitate accomodations elsewhere, so in schools it is often required that administrators understand and make allowances for the ramifications of the planned change.

It is believed that successful implementation is characterized by high levels of commitment by the users to the intended change, wide-spread awareness, agreement, and acceptance of the particular events and behaviors that define the change in operation as well as norms and operating systems that allow for errors and for their gradual elimination. Gross, Giaquinta and Bernstein (1971, pp. 203-214) note installation efforts must focus on more than initial resistance to change.

> . . . the degree of implementation of an organizational innovation will be a function of the extent to which management creates and/or maintains these conditions . . . (1) making the innovation clear to the staff members involved in implementation, (2) providing the training experiences required so that the staff will possess the capabilities needed to perform in accord with the innovation, (3) ensuring that the staff is willing to make an appropriate innovative effort, (4) making the necessary materials and equipment available for implementation of the innovation, and (5) rearranging prevailing organizational arrangements that are incompatable with the innovation.

New approaches to innovation in schools no longer champion the imposition of "teacher proof" changes by the school's administration on a "voluntary" faculty. It is realized that as the innovation is adjusted to the locality into which it is thrust resultant practice may depart consider-

ably from the developer's original scheme (Charters and Pellegrin, 1972). Available evidence indicates that a "top down" approach to planned change often stimulates and encounters ready opposition from the target population. More modern approaches regard teachers as responsible professionals willing and able with system support to make changes they see as desirable. In such a view, teacher inputs into the implementation activities are not only desirable in achieving system improvement, but also increase the likelihood that desired changes will occur. From these considerations one can abstract a number of potentially useful factors.

Project origins. To the extent teachers initiate and participate actively in deciding to adopt an innovation it is encouraging of implementation success.

Fate control. To the extent teachers feel capable of adjusting their level of participation in the innovation, they will accept more readily its consequences for their behavior. Fate control refers to collective teacher mastery over the growth and spread of the innovation in their school, as well as individual discretion over one's participation.

Estimates of cost-benefits. To the extent teachers see the benefits of the project outweigh its costs, they can better endure the difficulties of adjustment. Should project benefits seem relatively paltry, efforts to sustain implementation activities will be insufficient.

Realism. Knowledgeable cost-benefit estimates depend on the clarity with which teachers can visualize the implementation period and how their lives will be altered for having put the innovation into practice. To the extent the faculty sees among its ranks members who can speak knowledgeably about the innovation, and to the extent these persons reflect positive attitudes for embark-

ing on the project, teachers will favor the innovation. By the same token, to the extent inexperienced teachers have a reasonable sense of the time and difficulty that change might require, attitudes and expectations are less likely to be exaggerated beyond reasonable proportions.

Resources and demands. When time, materials, training, auxiliary personnel, and expert assistance are made available on a continuous basis, teachers will be better able to attend to the details of implementation activities. In this respect, when competing demands for teacher time and energy are minimal, additional gains in attention to implementation may be realized.

Ecology. Given knowledge of the innovation and its implications for other parts of the system, some settings are or can be made more compatible. For example, some innovations may require architectural changes and others, curricular, disciplinary or pupil reporting alterations. Systems that make these adjustments can smooth the way for installation.

System incentives. System rewards should be dispensed for the implementation of the innovation rather than only its adoption. In large measure system incentives are not controlled solely by the formal organization. A key incentive for teachers is the approbation of colleagues. When influential members of a faculty support the innovation, so too will the typical teacher feel it is to his or her advantage to go along.

Particular factors affecting the installation of units are included in the seven key factors described above. Each set is called a family. Each is comprised of a number of variables on which measures were taken shortly before the point at which the installation of units was to begin.

Each of the 17 schools has been assigned a score on each variable within a family. Scoring procedures followed roughly the same pattern through-

out. In each case raw data were assembled and the schools placed in rank order. Scores were assigned by inspection using the standard deviation as a guide. Where the raw values exhibited wide variation, as many as six (0-5) score values were used. If the variation was modest, a one, two or three point scoring system was adopted. In each case scores were assigned so that the highest scores were most promising of successful implementation. Family scores are the simple sums of the variable scores. More complex scoring procedures are described in greater detail.

Project Origins refers to the degree to which teachers participated in the decision to install units in their school. Typically, district personnel other than the teaching staff ultimately commit a school to a new course of activities. The MITT schools followed suit. In every case some non-teacher, an outsider, or district, or building administrator was directly implicated in bringing the unit organization plan to the school. However, there was considerable variation among the 17 schools in the extent to which teachers participated in and felt influential when the decision to install was being made. A variety of items were employed to score each school relative to one another according to teacher reports on their involvement in the installation decision. The six variables which comprise this family are listed below with code numbers that refer to specific items located in Appendix E.

Code	Variable
PR130	Origin of project decision
PR141	Teacher participation in the decision process
PR142	Consideration of teacher opinions
PR143	Consideration of own opinions
PR151	Teacher satisfaction with participation
PR152	Own satisfaction with participation

The items were administered to approximately half of each school's faculty in the spring of 1974. Responses for each variable were accumulated across all respondents in the school and scores were assigned to each school relative to its standing among all 17 schools. Given heavy emphasis were the reports of teachers designated as influential and esteemed members of the faculty.[1] School scores were adjusted to align closely with these responses. Scores per variable ranged from (0-4) points for a maximum family score of 24. Actual total scores range from 1 to 21 points.

Resources and demands. The provision of key resources before and during the early implementation period could augment the ability of teachers to learn and incorporate novel behaviors. To the extent other activities do not make heavy demands on the time and energy of the staff, teachers will be better able to attend to and accommodate the new project. To estimate the resource and demand mix a number of questions were posed to principals in a separate questionnaire. The variables are presented below. The reader is referred to Appendix E for the exact form of the questions.

Code	Resource variable
Principal Questionnaire	Consultants for teaming.
	Workshops for teaming.
	Team meetings in the spring of 1974.
	Team meetings in the fall of 1974.
	Frequency of team meetings in the fall.
	Activity of the Instructional Improvement Committee.
	Number of parent volunteers in the school.
	Number of paraprofessional aides in the school.

[1] The manner in which influential and esteemed teachers were identified is described in Note 1 at the end of this chapter.

Demand variable

Other innovations in the school.
Consultants for other innovations.
Lunch room duty.
Playground duty.

By whatever mechanism the innovation is brought to the school[2] the promoting agency usually provides consultant help, holds workshops and sets in motion the early identification of team members. (Thus, data pertaining to this family were collected and analyzed for both the spring and fall of 1974.) In schools of this variety there typically exists a faculty cabinet (Instructional Improvement Committee) comprised of unit leaders and the principal which manages the linkages among the various units and sets school policy.

Depending on the distribution of responses and the particular variable, a school might receive from zero to three, four or five points according to the rank of its position. Resource variables were scored positively. The greater the resource the higher the score. Demand variables were scored negatively. The greater the demand, the lower the score. Total family scores could reach a maximum of 49 points. In actuality, scores over the 17 schools ranged from 19 to 39 points.

Ecology. Ecology refers to the subtle staging of the school during the implementation period. Especially pertinent are a few structural characteristics that may make it more likely for teachers to discover common work interests and initiate collaborative instructional arrangements. Data for variables that com-

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[2]Two agencies have assumed major roles in the dissemination and installation of the multiunit school. The Wisconsin R&D Center and I/D/E/A, Kettering Corporation, promote the innovation widely using different linkage systems and somewhat different approaches. In addition there is a third group often associated with the schools. Usually found in a Title III Center or on a university faculty, they promote the innovation locally mixing both the Wisconsin and the Kettering approaches with strategies of their own.

prise this family come from the variety of sources indicated below. (See Note 2 at the end of this chapter for a more complete description of the variable regeneration status.)

Source	Variable
Personal Data and staff rosters.	Regeneration status
Floor plans.	Open space
Principal Questionnaire.	Assignment of students to units
Principal Questionnaire and teacher position reports.	Assignment of teachers to units

Schools could receive from zero to four or five points for the first and fourth variables. In the case of the second variable, open space, only three schools had some classroom areas in which teachers were visible to one another while teaching. These schools received one point. As regards the assignment of students, a school was scored one if assignments were made to the unit. No score was given when students were assigned to individual team members. Schools received points for the teacher assignment variable to the extent all teachers in the school were designated as team members in the spring and the fall of 1974 and to the extent teachers reflected these assignments on their personal data sheets used in the fall data collection.

The family score could range from zero to 11 points per school. In actuality scores ranged from 5 to 9 points.

Estimates of cost-benefit. If teachers feel an innovation will facilitate their instructional efforts they will be more likely to help with its implementation than if it is perceived to offer little or no advantage. A series of pertinent questions were posed to teachers. These are indicated below.

Code	Variable
PR171	Anticipated student benefits from the project.
PR172	Anticipated teacher benefits from the project.
PR173	Cost-benefit ratio of the project.
PR060	Educational goals enhanced by the project.
PR070	Educational goals hindered by the project.

Regarding the last two variables, teachers were first asked to rank 11 common and relatively discrete educational goals in order of importance to their school. Subsequently each was asked to note which goals would be enhanced and which would be hindered by the innovation. Scores were calculated according to how many of each individual's top four goals would be enhanced. Since very few persons reported their top four goals would be hindered by the project, no hindrance values were determined. Scores on the remaining four variables--items administered to one half of each faculty--took on values from zero to four. The maximum possible family score was 16, which one school obtained. The lowest value recorded was 5.

Fate Control. Where teachers feel they can regulate the extent to which an innovation involves their work, they may feel more inclined to accept its implementation. Such perceptions were gauged at both an individual and a collective level for both present and future points.

Code	Variable
PRO21	Teachers' ability to prevent installation now.
PRO22	Teachers' ability to prevent installation a year from now.
PRO23	Designated time for formal decision on project continuation.
PRO30	Manner in which I became involved in the project.
PRO41	Intensity of my present involvement in the project.
PRO42	Plans for future involvement in the project.

Data were collected from roughly half of each faculty in the spring of 1974. Scores were calculated according to the extent to which teachers expressed individual and collective control over the innovation. With four points possible per variable, total scores could have reached 24 points. The highest and lowest scores recorded were 19 and 3.

Incentives. Where both the formal and expressive systems of the school are marshalled to reward implementation efforts, it can be expected that greater effort will be expended, increasing the likelihood that implementation will occur. Questions were used to tap the teachers' perceptions of whom the school and district received support for the project. The responses of those persons who were nominated by their colleagues as influential and esteemed members of the faculty were watched carefully.[3] Principals gave information about the formal rewards for unit leaders.

[3]See note 1 at the end of this chapter.

Code	Variable
PR011	Perceived principal's support for the installation decision.
PR012	Perceived support of teachers in general.
PR014	My support for the installation decision.
PR160	Perceived support of other "persons who matter."
Principal Questionnaire	Team leaders present.
	Released time for team leaders.
	Extra pay for team leaders.

Data on the third variable, own support, were taken from every respondent. Otherwise all perceptual data were taken from measures administered to half of each school's faculty. The information about team leaders was received in the fall version of the principal questionnaire. Few schools provided team leaders with released time and extra pay. Those that did received two points for each. Scores on each of the other variables could reach four. The total possible family score was 20. Scores actually ranged between 16 and 9.

Realism. In order to have relatively accurate expectations for the promise of the innovation, as well as being a potential resource, a school about to venture on a new team teaching enterprise would likely benefit by having members of its staff experienced in some form of the innovation. The fate of the innovation would be enhanced also to the extent experienced teachers were favorably disposed toward the innovation and were influential in the affairs of the school. In addition, it would seem that realistic expectations for the rigors of the implementation period on the part of experienced and inexperienced teachers alike would bode well for the school. Thus, teachers in each of the 17 experimental schools were asked questions pertaining to the following.

Code	Variable
PR310	Teachers attributed with prior team teaching experience.
PR320	Influence attributed to the above.
PR330	Attitude attributed to the above.
PR014	Experienced teachers' own attitude.
PR111	Anticipated effects of teaming on my role.
PR112	Anticipated ability to change my role.
PR113	Orientation to adults.

The first four variables were combined to yield a single score for each school. For each of the four variables a school could receive four points for a maximum family score of 16. One school scored 14 for the highest rank. The lowest point total was five.

Table 1 contains the family and total scores for each school. The schools have been assigned fictitious names and are ordered by their rank on the resulting total scores.

Considering the distribution of the total or predictor scores, eight schools fall above, eight fall below, and the ninth ranked school falls on the mean. While the predictor scores range over 55 points (from 61 to 116) only two schools fall more than one standard deviation above the mean. Similarly two schools fall one standard deviation below the mean. Thus, the pattern of predictor scores is not sufficiently differentiated to predict each school's implementation success. There is enough evidence, however, to suggest three categories of schools relevant to implementation activities.

Those six schools whose scores range from 99 to 116 constitute the group most likely to install at least the structural basis

TABLE 1: Predictor Scores

		Project Origin	Resource and Demands	Ecology	Cost-Benefit	Fate Control	Incentives	Realism	PREDICTOR SCORE	Rank
(17)	St. Alice	17	39	8	12	11	15	14	116	1
(10)	Park Ave.	16	37	9	11	12	12	10	107	2
(06)	Deering	21	25	6	12	12	15	13	104	3
(08)	Lexington	14	33	9	10	9	15	10	100	4.5
(38)	Wellsboro	17	24	5	12	18	14	10	100	4.5
(11)	Collins	21	21	9	16	13	14	5	99	6
(07)	Baxter/Lane	9	33	7	10	16	12	9	96	7
(20)	St. Paul	14	22	8	14	13	14	10	95	8
(40)	Durban	11	31	5	8	12	15	10	92	9
(34)	Stoney Point	9	30	7	9	15	13	8	91	10
(19)	St. Agnes	4	25	7	9	19	16	9	89	11
(42)	Herndon	18	24	7	12	13	9	5	88	12
(09)	21st St.	12	25	5	11	12	13	8	86	13
(13)	Parkside	8	26	5	10	12	16	8	85	14
(18)	St. Mary	9	20	5	15	8	12	12	81	15
(15)	Pellegrin	1	36	8	6	3	10	9	73	16
(33)	Southside	3	19	5	5	11	10	8	61	17
	Range	20	20	4	11	16	7	9	55	
	Total	204	470	115	182	209	225	158	1563	
	Mean	12.0	27.6	6.8	10.7	12.3	13.2	9.3	91.9	
	S.D.	6.0	6.2	1.6	2.9	3.7	2.1	2.3	13.0	

for team teaching. The schools ranked 7 through 13 have intermediate scores which may indicate also intermediate levels of implementation success. The four schools with scores of 85 and below seem least capable of installing, let alone maintaining, the team structure.

In Table 2 the first six schools stand out as superior in almost every family, but especially in project origins, cost-benefit, and realism. These schools can be characterized as having had relatively heavy teacher input into the installation decision as well as relatively high proportions of enthusiastic faculty members with accurate estimates of the implications of the innovation for their work. The final four schools, lowest on all counts but one, are marked by meager teacher involvement in the installation decision and decidedly low staff estimates of the benefits that might acrue from participation in the project. Interestingly they are intermediate in realism.

The middle group also has a few distinguishing characteristics. They are intermediate in every family except fate control, where they score highest, and realism where they score lowest.

The mean scores tend to mask variation among members of each group but also help make the distinctions among the different groups more pronounced. Seemingly where teacher participation in the installation decision is greatest, where project benefits are viewed most favorably, where the innovation is seen in perspective, and the schools are best prepared by virtue of materials, personnel and resources, the chances of implementation success are greatest. The top six schools display, relatively speaking, these very features.

TABLE 2: Mean Predictor and Family Scores by School Group

School Group	Project Origins	Resources & Demands	Ecology	Cost Benefit	Fate Control	Incentives	Realism	Predictor
Top Six Schools	17.6	29.8	7.6	12.1	12.6	14.2	10.3	104.3
Middle Seven Schools	11.0	27.1	6.5	10.5	14.3	13.1	8.4	91.0
Bottom Four Schools	5.2	25.2	5.8	9.0	8.5	12.0	9.2	75.0

Conversely, in the last four schools teachers were not involved in the installation decision, show little mastery over their participation in the project, view the project realistically but see little advantage in attempting it, substantial implementation progress seems unlikely.

None of this may strike the reader as especially novel. Nonetheless, the data suggest the possibility of testing the efficacy of three variations on a theme of implementation. The top six schools represent what prototypically might be called a teacher input model of project installation. The lowest ranked group of schools employ a different approach; apparently one that relies upon little or no teacher input and a rather forceful introduction of the change on the staff by non-teachers. This can be referred to as the imposition model of planned change. The middle or intermediate of schools exhibit a torpid approach to planned change. Although there is noticeable variation among the schools that comprise this intermediate group, they appear to share an absence of strong forces pushing for the innovation. No one in particular seems insistent on its adoption and installation. This observation is keyed to the rather unusual pattern of family scores exhibited by this middle group. In contrast to teacher input and the imposition models, teachers in the torpid group have a less clear sense of the innovation as well as of the difficulties involved in its implementation. Coupled with a rather low key installation process, teachers in these schools may yet feel handsome masters of their own and the innovation's fate. In brief, they appear to be "conventional" schools in the sense the staff had been relatively untouched by the implications of the impending change. Their progress is expected to be intermediate.

Table 3 is a correlation matrix of all family and total scores. Each family score is at least moderately and directly associated with the predictor score, suggesting the existence of a more general underlying dimension. The pattern of intercorrelations among the various family scores is somewhat more complex.

The project origins score corresponds most closely with the total, predictor, score although it is not the largest family nor does it have highest maximum point total. Yet, the range of actual scores is greatest on this dimension and the variability among the 17 schools is nearly as great as in the resource and demand family where there is greater possibility for variation. Project origin accounts for 58 percent of the variance in the predictor scores. Thus project origins is emphasized in creating the three groups (input, torpid, imposition) of schools.

Factors Beyond the Unit Organization

The foregoing predicts which types of experimental schools are most likely to install units. However, the presence of units is not, as has been shown in Chapter IV, necessary for the emergence of task interdependence. Moreover, the presence of units may not be sufficient for task interdependence to increase. Four variables that are believed to be tied to team teaching as an emergent phenomenon in unitized schools are discussed in this section. The predictions advanced above, thus, are further informed by additional data. Before advancing these considerations, we discuss some general considerations of task interdependence in schools with a formal unit organization.

TABLE 3: Correlation Matrix of Total and Family Scores

Score	1	2	3	4	5	6	7	8
1. Project Origins	1.00	-.03	.27	.73	.29	.23	.09	.76
2. Resources & Demands		1.00	.48	-.30	-.25	-.08	.36	.46
3. Ecology			1.00	.20	-.15	-.02	-.08	.46
4. Cost-Benefit				1.00	.17	.23	.07	.54
5. Fate Control					1.00	.36	-.17	.31
6. Incentives						1.00	.30	.40
7. Realism							1.00	.43
8. Predictor (Total)								1.00

The promotional and supportive literature designed to assist schools in installing and operating the unit organization often promotes either explicitly or by implication the goal of individualized instruction. This goal may be more easily reached through the unit organization wherein there can be a continuous matching of student and team member characteristics. The press to individualize instruction can eventuate in increased levels of task interdependence, the more frequent exchange of common pupils within the same or across subjects. But as these instructional patterns require teachers to become more intimately involved in each other's teaching, they may run afoul of educational traditions that encourage teachers to work in isolation.

Teachers of the same unit may not enter into joint instructional ventures until or unless each evaluates the other's outlooks and practices to be in accord with his or her own. Compatibility, real or potential, however, is not sufficient to account for variations in task interdependence. Even with an "institutional press" for collaboration, teachers who are compatible may be prevented from embarking on joint instructional ventures by differences in grade level or team membership. It is also possible that the behavior of the school administrator may influence whether compatible unit members join forces. Furthermore, the normative structure of the school could require strict pursuit of independent classroom activities only.

These four factors (compatibility of views on the educative process, the norm of autonomy/equality, the leadership style of the principal and the manner in which team leaders are chosen) bear rather specifically upon levels of task interdependence one might observe in unitized schools. Each is discussed below.

Compatibility of views. Wehling and Charters (1969) developed an instrument called "Teacher Conceptions of the Educative Process." It consists of eight subscales, three of which, personal adjustment ideology, student autonomy and consideration of student viewpoint, were chosen for the companion study. The subscales are largely orthogonal to one another and the resultant scale scores are assumed to be independent. Thus, a profile for each respondent can be compared to that of every other teacher in the school. Compatibility in outlooks in a school then can be indicated by Cronbach's D^2, in this case the average squared difference between all possible pairs of teacher profiles.

At the time of the first data collection the school proved to be the only comparable unit of analysis. The resultant values of D^2 indicate considerable variability between and among the 17 "experimental" schools. The scores ranged from 11.32 to 2.96 or over 8.36 units, with a mean of 5.87 and a standard deviation of 2.19. Schools with the largest values of D^2 are those in which teacher views are least compatible. Schools where teacher points of view are most alike will constitute those which, if all else were equal, would show the first significant increases in task interdependence.

The autonomy/equality norm. For more than a decade Lortie (1964, 1969, 1973, 1975) has written about the normative structures of the elementary school. He, like many other students of schools as organizations, finds little to suggest that the formal organization, the teaching profession, or other explicitly organized external influence go far in explaining variations in teacher behavior.

In his work, especially that which bears upon team teaching, Lortie (1964) accounts for this lack of external influence on teacher behavior, in part, by the particular normative system that emerges in schools. A critical norm, autonomy/equality, describes teachers as autonomous operators who should be treated evenly by the organization and in the eyes of the public. Such a norm, a veil of homogeniety, implies all teachers are equally capable in their work, and different teachers have functionally equivalent ways of expressing their competence. It is not proper to judge some teachers as "better" than others or reward teachers differentially on the basis of presumed merit. Rewards of significance to teachers are largely intrinsic and derive from students and colleagues. Teacher access to intrinsic awards should not be disturbed unduly by the formal organization, other teachers, parents, or "outsiders" in general.

The norm is "double-headed." Autonomy assures equality of extrinsic rewards. Equality preserves the teacher's autonomy and self-determined access to intrinsic satisfactions.

In team teaching schools Lortie (1964) permits the inference that units may evolve a vertical-bureaucratic structure, where the norm strictly enjoins teachers to its implications. The official unit leader will play the role as if he or she were a member of the administrative layer of the organization and so preclude more than minimal exchanges between and among team members. Conversely, where the norm is weak,

where "deviant" behaviors are tolerated, if not approved, a horizontal-collegial team structure will emerge. In this pattern a more free exchange of ideas, equality of function and status between members and leaders, and more ample opportunities for communications and collaboration will result. These more collegial arrangements imply the evolution of task interdependence. The vertical bureaucratic pattern carries the opposite implication.

Jackson (1960, 1966, forthcoming) presents a most attractive conceptual and operational scheme descriptive of social system norms. A norm, he argues, is a social system output. The output is the potential response one might receive for an action. The regulatory potential of the norm depends upon inputs. The inputs are the concern members of the social system have for a particular behavior. How this energy is utilized depends on the degree of consensus among members for the acceptability of the behavior.

For example, if the energy put into the system is high and there is consensus that a particular action is not appropriate, then, the potential return for an actor who performs in the specified manner is organized--and in this case the behavior will probably be avoided lest negative sanctions are brought to bear. Conversely, if the input of energy into the system is high but there is much disagreement about the appropriateness of the behavior, then the output of the system is more likely to be (potential) conflict rather than a salient norm. Such a system is disorganized. When input is low, and consensus is high, there is vacuous consensus where the behavior is tolerated without conflict.

This condition is called unorganized.

The complex measurement strategy is fully described in the references cited above. Essentially the technique involves two scales, a behavior dimension and a return dimension. Typically the respondent is shown five intervally scaled amounts of the same behavior--the behavior scale--and for each of the five the respondent is asked how much he or she would approve or disapprove--the return scale. For example an item might read, "What would be your reaction if a member of the faculty came late for work," one day per week, two days per week, three days per week, and so on. For each particular behavior the respondent expresses approval or disapproval on the nine or eleven point return scale. Thus for a behavior it is possible to obtain a range of approval-disapproval along its scaled dimensions.

The output of the normative system is described in terms derived from the mean absolute difference of all return responses to a particular behavior from the mid-point of the return scale. Absolute departures from the mid- or indifference point are summed to give a measure of intensity, the amount of energy going into the system. The variance in return scores for any particular behavior marks the degree of consensus of energy put into the system. From these it is possible to extend the data into more refined mathematical and theoretical concepts, normative power and conflict potential, which become the primary bases upon which one determines the organization of sentiments in the social system. Taking into account the mean item scores it is possible

to assign the direction of organizational sentiments, and to establish in descriptive terms the structure of a norm in the social setting.

Where intensity is high and consensus is at a maximum, normative power is high and conflict potential is low. When consensus is at a minimum the major system output is conflict potential. Considerable energy is put into the system but there is little agreement about how it should bear on a particular behavior. When intensity is at a minimum and consensus is at a maximum, both normative power and conflict potential are low.

To measure autonomy/equality, items were prepared to pertain as much as possible to only one concept. One set of items was prepared for equality and another for autonomy. This proved to be difficult exactly for the reasons Lortie conveys: disturbing equality implies loss of autonomy and vice versa. Nevertheless, to prepare "double loaded" items would have been to err in favor of confusing the respondent and in added difficulty in interpreting the responses.

Behaviors which fit the norm do not lend themselves to interval scale logic. Rather, autonomy is comprised of the characteristics of the actor, the locus and the visibility of the behavior, and since autonomy always implies two parties, actor and other, the characteristics of other. The same is true for equality.

Generally teachers in all 38 schools[4] disapproved of each of the 13 behaviors included in the two behavior scales (6 under equality and 7 under autonomy--See Appendix E). Items which contributed little to

[4]The measure was first used in the fall of 1974, wave 2.

between school differences were dropped and only five items for each scale were used in the analysis.

These items displayed useful variation among the 17 experimental schools particularly with regard to conflict potential and normative power. Because the normative power scores were typically greater than zero, the ratio of normative power to conflict potential was taken to represent the degree to which the social system was organized--the extent to which it produced a salient norm.[5] This ratio, called the organization of sentiments, was then multiplied by the direction of sentiment--the algebraic average deviation from the point of indifference--to yield a social system return score for each school for autonomy and for equality. These two scores were then added to yield a single autonomy/equality social system return score.

Schools with the highest negative return score were deemed those in which the autonomy/equality norm was potentially most restrictive of task interdependence. Schools with the least negative return scores were deemed most likely to permit, or tolerate teacher-teacher collaboration. Scores ranging from zero to four points were assigned to each of the 17 schools according to the distribution of return scores. Two schools with the lowest negative values received four points. One school with an extremely high negative value received zero points.

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[5]Normative power and conflict potential values were computed for each item. The mean normative power and conflict potential values for the five autonomy and the five equality items were then computed and used to form this ratio.

Leadership style of the principal. Halpin (1966, 131-249) measures organizational climate from the perception of teachers about staff and principal characteristics. He reports six prototypi organizational climates based upon school climate profile scores obtained through use of the Organizational Climate Description Questionnaire, OCDQ. These, by implication, fall on a rough continuum ranging from an open climate to a closed climate.

In the open climate (Halpin, 1966, 175-176), ". . . teachers work well together without bickering and griping . . . and are sufficiently motivated to overcome frustrations and difficulties." In the open climate the principal, "possesses the personal flexibility to be genuine whether he is required to control or direct the activities of others or to show compassion in satisfying the social needs of individual teachers."

In the closed climate (Halpin, 1966, 180-181), " . . . teachers are disengaged and do not work well together; consequently group achievement is minimal." The principal is characterized as a "phoney" by his staff being seen as generally ineffectual in carrying out his leadership function.

Based on these descriptions and their apparent relation to task interdependence, if not to the entire change process, teachers completed that part of the OCDQ pertaining to characteristics of the principal. It consists of four subscales, aloofness, production emphasis, thrust, and consideration with roughly nine Likert type items per set. Half of these items were placed in form A and half in form B of the questionnaire administered to teachers at the first data collection. This strategy goes

against Halpin's recommendation that all persons respond to all items and was chosen to reduce response time and in light of the secondary nature of the prediction study.

In the final analysis scores taken from the combined responses of each half of the faculty of each school were not handled in the usual manner. Typically a climate profile is constructed and when compared to prototypic profile scores allows one to classify the school according to which of the six climates it most approximates. Here only data from the thrust and consideration scales were taken into account. These differentiate most clearly between the open and closed climates and seem most applicable to leadership behaviors related to task interdependence.

Thrust is a means of motivating others through personal example. It seems highly task oriented but makes a favorable impression upon teachers. Consideration refers to the action of the principal in helping staff members cope with both personal and professional problems including settling minor differences among staff members. In the open climate the double standardized thrust and consideration scores are above average with regard to principals in other climates and with regard to the other principal characteristics, aloofness and production emphasis. As a pair, the two scores average greater than comparable pairs of scores of principals in other climates.

The 17 schools were ordered according to their average leadership characteristic score--the sum of the double standardized thrust and consideration scores divided by 2--and assigned zero to four points

according to their rank order. One school in which the principal was portrayed as having high thrust and high consideration was scored 4. Three schools were scored zero.

Determination of the unit leader. Lortie (1964) first speculated that differences in the way the officially designated unit leader played that role could affect the work patterns among unit members. Team teaching, Lortie (1964, 280-286) observes, combines two elements into an unstable mixture, close working relationships and hierarchical rank. In this case hierarchical rank refers to a new distinction in the role of teacher, the unit leader. Where the unit leader plays the role in a supervisory or otherwise authoritarian manner, it can be inferred, teachers will exercise considerably less initiative. Where the unit leader acts as a colleague, Lortie suggests, the team will champion collective responses to problems and issues.

Where the unit leader has authority over unit members, task interdependence will be less likely to occur. Where the leader is not regarded as higher in status, where status is submerged in favor of group solidarity and collective action, task interdependence is fostered.

The question, therefore, becomes one of trying to predict in advance how unit leaders will come to play their roles. Short of intricate measurement techniques pertinent to this task, the simplest, substantial approach is to ascertain how unit or team leaders came to be chosen.

An observation taken from other research (Packard, 1973) keyed this choice of strategy. In multi-unit schools in Wisconsin differences

in the conduct of unit meetings aligned with differences in the manner in which the unit leader was selected. Namely, where the unit leader was appointed by the school principal, and in some cases also by the district superintendent, teams seemed much more "upward looking." Team meetings were conducted around agendas prepared by the principal for faculty cabinet meetings--which the team leaders also attended. This feature seemed to characterize the general attitude of the team toward the authority of the principal's office--a manner suggesting dependency, lack of self-initiative and little experimentation.

Where the unit leader was chosen by the team members there was less of a tendency to follow the faculty cabinet agenda during team meetings, and a correspondingly greater proclivity toward self-initiated and self-governed sessions. This characterized attitudes and behavior over a broad range of activities including considerations of scheduling, room assignments and covering for an absent teacher--who, by the way, had to clear his absence with unit members only.

Therefore, principals in the spring of 1974, and principals and teachers in the fall of 1974 reported how the unit leaders were chosen: "by the principal, by team members, by the principal and team members jointly," or in some "other" fashion. The correspondence between teacher and principal reports was nearly perfect in all but four schools. A closer look at the responses of unit members in these schools revealed a differentiated selection pattern, *e.g.*, the principal designating the unit leaders for some teams and some teams determining their own. In a

few cases team leaders were said to have volunteered for the position and in others the method of selection was to "flip a coin", a feat sometimes performed by the principal and sometimes not.

On the basis of the foregoing rationale, schools in which all unit leaders were selected only by the unit members received a score of three. Schools in which the majority of leaders were volunteers, were chosen by their team members or were randomly selected were scored two. Schools in which the majority of leaders were chosen jointly by the principal and the team members received a score of one. Where the principal selected all or nearly all of the team leaders, schools were scored zero.

When, as in Table 4, these additional predictor scores are arrayed and totaled in conjunction with the unit predictor scores, there appears one simple pattern. Schools most likely to install units seem to have the least favorable conditions for team teaching. Such schools average lowest in compatibility of views, in the leadership style of the principal and in the manner in which unit leaders were chosen. Teachers in the torpid and imposition schools generally share more compatible views, have somewhat more appropriate principals and are more likely to have participated in choosing leaders. By inspection, factors thought to be related to the installation of units seem unrelated to factors estimated to be tied more specifically to team teaching.

These "results" are rendered somewhat less perplexing by the pattern of correlations between and among the various specific predictors. Though not shown here, no pair exhibits a very strong association. The most pronounced are between autonomy/equality and unit leader

TABLE 4: Unit and Additional Predictor Scores by School Type and School

School Type	School	General Predictor Score	ADDITIONAL PREDICTOR SCORES: Compatibility of Views	Autonomy Equality	Leadership	Unit Leader Choice	Total
Teacher Input	17 St. Alice	116	1	1	3	2	7
	10 Park Avenue	107	1	0	2	0	3
	06 Deering	104	1	2	2	1	6
	08 Lexington	100	2	2	3	0	7
	38 Wellsboro	100	1	4	0	0	5
	11 Collins	99	2	1	1	2	6
		$\bar{x}$	1.33	1.67	1.67	.83	5.66
Torpid	07 Baxter/Lane	96	2	1	1	2	6
	20 St. Paul	95	1	2	1	3	7
	40 Durban	92	2	3	3	1	9
	34 Stoney Pt.	91	1	1	0	1	3
	19 St. Agnes	89	4	2	2	3	11
	42 Herndon	88	2	2	3	1	8
	09 21st St.	86	3	2	3	0	8
		$\bar{x}$	2.14	1.85	1.86	1.57	7.43
Imposition	13 Parkside	85	3	2	0	0	5
	18 St. Mary	81	2	2	1	2	7
	15 Pellegrin	73	0	0	4	1	5
	33 Southside	61	3	1	2	3	9
		$\bar{x}$	2.00	.80	2.19	1.50	6.50
	Total	Σx	31	28	31	22	112
		$\bar{x}$	1.82	1.65	1.82	1.29	6.59

choice (-.26), leadership (-.35) and compatibility of views (.32). Other values indicate no association between pairs of specific variables.

Evidence of the independence among the various scores, while bothersome from a theoretical standpoint, suggests a pragmatic solution. The predictive worth of the various variables can be ascertained more readily after increases in team teaching have been observed.

Final Predictions

The companion study relies on two fundamental arguments. Team teaching is more likely to occur in schools which install units, and in units, it is more likely to occur where four other conditions are strongly present. The first of these seems the more solid foundation upon which to speculate. Schools designated most able to install units will show first increases in task interdependence. Within the various groups of schools the other more specific conditions may come into play.

For example among the torpid schools, St. Agnes seems especially well qualified to produce higher levels of teaming, should units be installed. On the other hand school 10, Park Avenue, for the reasons indicated may not show much improvement in its task interdependent status even if it does install units with ease. Southside (33) in the imposition group will not install units and therefore not show increases in task interdependence despite evidence of otherwise productive circumstances.

It makes little sense to further refine these predictions until the data on task interdependence are in. The next phase of analysis will be to cast observed levels of task interdependence in the 17 schools against these predictor scores. Hopefully, what can grow out of these future analyses will

be a more firm theory of implementing educational change in educational organizations. By coupling the data derived from analysis of the companion study with those collected longitudinally in the prime study, the Project may also inform and align in a rather unique manner the traditions from which both studies derive.

NOTES FOR CHAPTER V

1. Teachers in each school were asked in two separate questions to nominate those persons whose (1) support for their ideas would help most in obtaining approval (Power PR650) and (2) suggestions would be most useful in solving school problems (Esteem PR660). For each question persons were designated as powerful or esteemed in the school if the number of nominations they received where unlikely to occur by chance alone. If in a school where N nominations were made and two persons received a certain high number R nominations each would be acknowledged as powerful or esteemed should it be determined that .5 or fewer persons could have received R votes due to chance alone. Here the formula $\sum_{S=R}^{N} \binom{N}{r} p^s q^{n-s}$ was used to compute probability values.

   We did not take into account the assumption a respondent would not nominate himself.

2. McNeil and Thompson (1971) present an index of regeneration measuring the rate of change in the ratio of newcomers to veteran members of an organization; that is, the time elapsing before the ratio becomes 1:1. Using the same basic ratio, newcomers to veterans, we developed an index of organizational stability which we also refer to as regeneration. We actually computed two regeneration ratios. The first was the number of teachers with only one year of tenure in the school in the spring of 1974 divided by the number of respondents in the school. The second was the ratio of new teachers to the total number of teachers in the school in the fall of 1974. (The different denominators reflect our improved confidence in the knowledge of the members of each staff in terms of which members were regular classroom teachers and how long each had been in the school. In most schools the response rate was 100%.)

   For each period schools were classified on the basis of the relative size of their regeneration ratio displaying low regeneration (values ranged from 0 to .12), intermediate regeneration (.19 to .38 for the spring ratio and .14 to .30 for the fall) and large regeneration (up to no more than .5 for any school). Derived then was a nine cell matrix comprised of low, intermediate and large regeneration for the spring along one dimension and for the fall fitted along the second. Values from 5, most stable, to 1, least stable, were assigned to the nine cells according to the following rationale. Two problems compete for the available energy of teachers in schools about to install team teaching. The first is the technical details of the innovation. The second is settling upon patterns of more intimate work relations. Our thesis is the more energy that is diverted to establishing work rela-

NOTES FOR CHAPTER V (Continued)

tions, the less is available for dealing with the technical details of the invention.

Conversely, where work relations are more advanced by virtue of most teachers having worked together in the school for at least a year, the chances of mastering the technical details productive of task interdependence are improved. Stability scores were assigned to the regeneration matrix so that those schools experiencing low regeneration over both periods received the highest value. Those that showed low or no regeneration in the fall of 1974 received the next highest value. Those that were stable in the previous year but changed moderately (were more regenerative?) in the fall were scored an intermediate value. Schools that experienced high regeneration in the fall and moderate to high regeneration in the previous year received the lowest stability scores. This is displayed in Table 8 below.

TABLE 8: Stability Scores According to Regeneration Status

		Fall 1974 Regeneration Status		
		Low	Intermediate	High
Spring 1974 Regeneration Status	Low	5*	3	2
	Intermediate	4	3	2
	High	4	1	1

*Cell entries are stability scores assigned to the schools which fall in each matrix. The higher score represents a more stable organization, one more likely to install the innovation.

APPENDIX A

Task Interdependence Among Teachers: Measurement and Findings

A central question of the MITT study is whether the several consequences of "team organization" reported in the percursor investigations of Pellegrin and of Meyer and Cohen can be traced to an alteration in the managerial structure of schools or to a change in instructional organization. Confusion is introduced by the fact that the same, or highly similar, words are used by educators to refer to the particular management structure and to the particular instructional organization--"teams," "teaming," "teaching teams," "team teaching," and so on. On the one hand, "team teaching" ordinarily refers to a type of instructional organization in which two or more teachers jointly carry out instructional operations for the same group of students rather than each working alone with his own class (Shaplin, 1964), and teachers operating in such a mode typically refer to themselves as a "teaching team." A school in which this instructional organization is the prevailing mode sometimes is characterized as having a "team organization." At the same time, when the managerial structure of an elementary school is altered and the teaching faculty is formed into small, subsuming units, the units are often labeled "teams" and this school, too, is said to have a "team organization."

To answer the central question, it was necessary for MITT researchers to maintain a firm distinction between changes in the school's managerial system and changes in its work system. Changes in the

school's instructional organization, according to the research plan, were to be observed by continuous monitoring. This appendix describes our work toward conceptualizing and measuring the instructional organization of elementary schools, in particular the extent of task interdependence among teachers.

Conceptualization

The MITT staff chose not to confine the measurement problem to team teaching *per se*--to the mere determination of whether or not a team mode of organization obtains among a set of classroom teachers. Our decision was based, in part, on the fact that the term is used in the ordinary parlance of school practitioners to cover widely disparate instructional patterns and impromptu arrangements, depending on the immediate context and particular advantages to the user, and on our recognition of the semantic tangles into which a precise but arbitrary definition would lead. We saw utility in a procedure that would lend itself to objective measurement and not depend on self-descriptions or the varying definitions of respondents. Moreover, we believed it would be valuable to develop a measure around a generic property of productive organizations rather than around a concept that was specific to the school (and to the elementary school, at that).

The concept of *task interdependence*, found in the literature of organization theory, seemed especially propitious for expressing a key ingredient of the idea of team teaching and, at the same time, for referencing a basic dimension of an organization's work system. As used here, task interdependence concerns the relationships that arise among

primary workers in an organization (meaning classroom teachers in our case) by virtue of their location with respect to one another in the workflow. Following the writings of Weick (1965), interdependence exists between two workers to the extent that the task performance of one worker constrains, augments, or otherwise poses contingencies for the performance of the other. The relationship can be asymetric, of course, such that one poses contingencies for the other but not *vice versa*, a condition caught up in the idea of sequential interdependence (Thompson, 1967) or simply dependence, but we will not use this terminological refinement here.[1] Task interdependence has theoretical import for the managerial functions of a cooperative enterprise. The condition of task interdependence in a goal-oriented organization sets up a need for coordination--an organizational need for mechanisms to minimize the occurrence of contingencies that would cause task performance to suffer. Forms of task interdependence, too, help shape and define the character of social relationships emerging among the organization's participants.

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[1] We have restricted our attention to task interdependencies mediated by the workflow. There are other types, and typologies, that do not implicate location in the workflow, or implicate it only in a general sense. Thompson's (1967) pooled interdependence is a case in point. We have delineated a type similar to pooled interdependence of especial relevance to the managerial functions of schools, and potentially, to the operation of managerial units in unitized schools. We call it *resource interdependence*: the circumstance in which two or more teachers draw on the same scarce resources each requires for his teaching (resources like materials, space, or the services of specialists and paraprofessionals). In principle, the particular sites of resource interdependence can be identified in the school and investigation made of procedures for coordinating or resolving conflicting demands, including the locus of responsibility for doing so. The connection of this with the school's control structure, discussed elsewhere in the report, should be apparent.

Pupilflow. The idea of workflow comes from industrial engineering, where the technical terminology and analysis procedures have had a long and distinguished developmental history (*e.g.*, Maynard, 1956, Sections 2, 6). In our present application, however, we have in mind the simple notion of the movement of pupils from one teacher to another for the purpose of classroom instruction; we refer to it as *pupilflow*. In identifying the pupilflow(s) in a school, and thereby defining instances of task interdependence, it is crucial to specify a time frame within which the flow is to be considered. If viewed within the time frame of an academic year, a school might show no teacher-to-teacher movement of pupils at all, each teacher working independently with his or her own class; but if the time frame were extended to encompass two years, the flow would link teachers of adjacent grades; and a longer extension would produce interdependence among still more teachers.

Team teaching and its alternatives (the self-contained classroom, departmentalization) describe characteristics of the pupilflow within the boundaries of an academic term or year, so a less extended time frame is the relevant one for our purposes. Since the academic year constitutes a naturally occurring activity cycle of most American elementary schools (excepting the few with semi-annual promotions), and a convenient dividing line between less and more subsuming time frames, we have used it as the frame for defining task interdependence.

In principle, a school could have no pupilflow at all, as would be true in the pure type of the self-contained classroom, or it could have as many different flows as there were pupils. In practice,

the latter is an unmanageable situation for any but the tiniest of schools, although efforts to move in some degree in that direction are envisioned by programs of highly individualized instruction. As a matter of necessity for pupils and teachers alike, schools "batch" pupils for purposes of instruction, typically by grade-level and classroom, and channel the inter-teacher flows, if such occur, in a regularized fashion. The pupilflows in a school could be quite discrete, linking certain teachers in an interdependent system and holding them apart from other teachers, or the pupilflows could entail considerable cross-overs among teachers, connecting a larger number but perhaps less intimately. Thus, a special program for mentally handicapped children might confine the pupilflow to the specialist teachers working together as a tightly-knit group in isolation from the remainder of the school, or the program could be operated by moving the pupils into and out of the regular classrooms, thereby creating interdependencies with other teachers. Apart from the educational implications, which can be argued on both sides, the choice of pupilflow, we believe, has an important influence on the school's adult social structure.

Our conceptualization suggests that it is important to distinguish two types of task interdependence arising from teacher location in the pupilflow--important because the means required for achieving coordination differ substantially in their time-costs and conditions for success, and also because they represent the two general directions which teacher collaboration typically take. One is *throughput interdependence*, the less demanding of the two (in schools), and the other we call *instructional interdependence*.

Throughput interdependence. In serial manufacture and like productive systems, a worker cannot begin a step in the processing sequence until the material to be processed has been released and delivered from the preceding step. In some circumstances, where unforeseen contingencies produce large variations in rates of processing, effects on the task performance of workers later in the sequence can assume important proportions, and one common means of reducing the effects of such time dependence is to maintain buffer inventories of the products completed in the preceding step (March and Simon, 1958).

The school cannot be construed as akin to serial manufacture nor can pupils be stockpiled for later processing as physical throughput materials can,[2] but there is a clear parallel to this form of interdependence in the pupilflow. Throughput interdependence refers to the circumstance in which one teacher cannot proceed with his or her instructional activities until the pupils he or she is to teach are released by another teacher. Thus, the lesson plan of the regular classroom teacher for a social studies unit may be impacted if the physical education teacher keeps the class, or even part of the class, on the playground an extra tem minutes to complete an activity.

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[2]It is interesting, though, to consider common school practices from the viewpoint of stockpiling. Jackson (1968) noted with surprise the amount of time in the classroom day pupils spend in waiting--waiting in lines, waiting to recite, waiting for the teacher's help, and so on. Enrichment activities and end-of-year reviews for students who finish the year's work early may be seen, too, as a means to avoid encroaching on the instructional program of next year's teacher.

The obvious coordinating mechanism for throughput interdependence is the class schedule, often accompanied by bells or other audible reminders signalling the end of periods. While the initial task of establishing the schedule may take some effort and severe disruptions may accompany frequent schedule changes (Reynolds, 1972), it is a low-cost, impersonal, and generally effective coordinating device.

Instructional interdependence. Where the preceding type of interdependence concerns only those contingencies teachers pose for one another in the timing of their work, instructional interdependence focuses on the substance of task performance--on the ways beyond timing in which the instructional plans and activities of one teacher hinder or augment the activities of another. The teaching-learning process is not like many other productive systems where processing steps are narrowly and intimately cumulative, where the success of a processing activity hinges on the successful completion of an immediately preceding activity. With enough time, of course, some sectors of the educative process can, indeed, be seen as cumulative; a class in English literature can hardly be taught to pupils who have not yet learned to read. But in the short run, such sequential dependencies are the exception, not the rule, and are likely to remain so until the technology of instruction is substantially advanced.

Nevertheless, one can envision gross ways in which the instructional activities of one teacher can affect the plans and activities of others with whom s/he work. An organizational pattern for science, for example, where one teacher is to put on a puzzling demonstration for the

assembled pupils, the educational point of which is to be brought out in follow-up discussion sections by several other instructors, would certainly fail in purpose if none of the latter knew what the demonstration had been or what its point was. Two teachers teaching American history together in the same room would obviously be disaccomodated if one planned for pupils to work on their independent writing projects and the other intended to show a film. These illustrations are gross, but they point out the general character of the contingencies and the essentiality of coordination among the implicated teachers.

The means of coordination that prevent teachers from working at cross-purposes and otherwise disaccomodating one another in situations of instructional interdependence are not obscure, but they introduce significant new conditions of success. Coordination simply involves people talking to one another, letting others know of one's ideas and intentions, and then of making mutual adjustments. Coordination is achieved by face-to-face communication, perhaps no more than a few words or a sign, and by a willingness to accede to one another in the event of differing ideas. The mechanism, however, is no longer an impersonal one like a schedule, which can be effective even if the participants do not know each other, even if they are bitter enemies. Rather, it invokes a social relationship in which meanings are exchanged, points of view explored, status relations acknowledged, and self-worth exposed, and success of the mechanism is as fragile or strong as the personal relationships on which it depends. It is a

comparatively high-cost device in terms of the time it requires for communication and the resolution of differences, the more so the more frequently teachers join together in the instructional process and thereby pose contingencies for one another. The costs are especially great when the personal relationships have yet to be established or when disparities in educational views are wide and adamantly held, but still they can diminish to a low level over time as the participants gain the experience and assurance of working together.

The two types of task interdependence we have outlined correspond to the two directions instructional organization can take when teachers in the elementary school are urged to form collaborative work systems or "teaching teams" among themselves. One direction is to divide the labor along subject-matter lines (Teacher A to handle all the science instruction for the combined pupils, Teacher B to teach math, Teacher C social studies, and so on), to set up a system of periods and classes, and to establish a schedule that appropriately routes pupils through the classes and periods. Each teacher teaches his or her subject to the classes independently of the other teachers and is linked to them solely by throughput interdependence. This direction extends to academic subjects of the elementary school the pattern commonly applied to art, music, and physical education and, obviously, emulates the conventional pattern of high school and college. The pattern is modified in many ways--in numbers of teachers implicated, number of subject-areas divided, and on and on--and, indeed, the possible permutations of teachers and subjects

seems almost without limit.[3] As intricate as the pattern may be, it operates essentially as a system of throughput interdependencies.

The other direction is toward what we might call, for want of a better term, *bona fide* team teaching. In one of the rare analytical treatments of a programmatic innovation in education, Shaplin defined team teaching as,

> a type of instructional organization, involving teaching personnel and the students assigned to them, in which two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students (Shaplin, 1964, p. 15)

Elaborating on the clause, *for all or a significant part of the instruction*, Shaplin emphasized that, while projects may start in a very small way with teachers collaborating in only one class or subject area as a strategy for introducing teachers and students to the processes of team teaching, the label is not justifiably applied until joint instruction occurs in most of the curriculum areas. This precludes the kind of subject-matter division of labor described above where each teacher teaches his or her subject alone. Thus, a step in the direction of *bona fide* team teaching is a step in which not only do two (or more) teachers teach the same pupils, but they teach them in the *same subject area*.

It is defensible to argue, we believe, that contingencies in the substance of instruction--the kind that define instructional

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[3]We calculated once that there are 534 ways in which up to five teachers can be implicated in teaching five subjects, assuming that between them all subjects are taught.

interdependence for us--are far more likely to occur when two teachers teach their common pupils the same subject than when they teach them different subjects. That is, it is much more essential for each to take account of what the other is doing with the class if both are teaching science, say, than if one is teaching science and the other social studies. This is not to deny the possibility of contingencies arising between two teachers who are attempting to "correlate" their two subjects, but this is so rare a condition in elementary schools (and effects of breakdowns in coordination so imperceptible) that we feel we can ignore the contingencies without doing undue violence to the bulk of educational practice.

In sum, throughput interdependence obtains between teachers sharing pupils in the pupilflow when they teach them different subjects; carried far enough, the pattern corresponds to the conventional mode of high schools and colleges and often is referred to as departmentalization. Instructional interdependence exists when teachers not only share in the same pupilflow but teach in the same subject area; carried far enough, the pattern represents *bona fide* team teaching.

There are yet other patterns of instructional organization that escape the net of the two prominent directions of movement. Aside from the state of task *in*dependence where pupilflows are nonexistent (the pure type of self-contained classroom), a form worth noting entails a redivision and reassignment of the pupils in two or three classrooms for instruction in a particular subject. Thus, two teachers may identify the reading abilities of pupils in their respective classes, one agreeing to

teach the "low" group for a term and the other to teach the "high" group; it is, in effect, an effort to achieve homogeneous grouping. Applied to enough subgroups, the pattern approaches a purely individualized instructional program.

Degrees of task interdependence. There is considerable utility for measurement purposes in applying a metric to an organizational property like task interdependence, or to each of the component types, and we have formulated a basis (as well as an operational procedure) for doing so with respect to instructional interdependence. In measuring the *intensity* of instructional interdependence between a pair of teachers, we begin with the fundamental assumption that intensity is a direct function of the frequency of events that are likely to impose contingencies and thereby demand coordination. As we have noted, instructional interdependence ordinarily requires communication directly between the parties involved in the task performance. Thus, a more colloquial way of phrasing the assumption is that the more often teachers teach together, the more often they must talk about what they are going to do or what they have done in order to avoid working at cross-purposes.

The concept of *rate of pupil exchange* is our operational indicator of the frequency (per unit of time) of these contingency-imposing events. We assume that the rate at which pupils move back and forth between two teachers for instruction in the same subject, the more often they must take account of and adjust to one another's

instructional activities. The extreme of the rate is reached when both teachers work with the pupils simultaneously in the same room. Thus, the intensity of instructional interdependence is immediately expressed by the rate of pupil exchange between the implicated teachers.

By the definition of instructional interdependence, the pupil exchange in question occurs for a given subject, and our operational procedures, which we explain shortly, permit us to obtain information about exchanges by subject. In order to reach an intensity score for a pair of teachers, we sum the rates of exchange over all their common subject areas. We have used an unweighted, additive score, since we lack a rationale for weighting subject areas according to the severity of the contingencies likely to be imposed, and have no compelling reason to suppose that the severity of contingencies, or strength of coordination demands, is something other than cumulative as the number of subjects increases.

Intensity of instructional interdependence applies to a *pair* of teachers. The pair-wise scores intensity scores may be aggregated for all the possible pairs of teachers at a grade level, in a system of interdependence, in a managerial unit, or in the school, depending upon one's interests. We refer to such an aggregation across pairs as the *extensity* of instructional interdependence, noting of course the particular collectivity of interest.

As of this writing, the intensity metric has not been derived systematically from our data. Later in the appendix we describe the

abbreviated indexes that have been developed and used in these first data analyses.

Measurement Procedures

As our foregoing conceptualization has delineated, it is necessary to identify teachers who are connected by the pupilflow(s) in order to describe the instructional organization of the school and to measure task interdependence. The method developed by the MITT staff entailed, first, obtaining from each regular classroom teacher a record of his or her instructional contacts with a sample of the school's pupils for ten consecutive school days and, then, reassembling the information to reveal instances in which pupils were taught by two (or more) teachers and whether the pupils' instruction was in the same subject or whether it was in different subject areas.

The teacher logs. To facilitate the record-keeping process, the research staff furnished teachers with a "teacher log" fashioned after the familiar attendance booklet. Down the left side of the page is a list of pupils in the school whom the teacher *might* teach in the course of two weeks (actually running to three or four pages in a large school), and five half-pages represent five standard subject areas in which elementary-school pupils receive instruction. Ten columns on each half-page allow the teacher to make a record of whether or not s/he taught a listed pupil in the subject on each of ten consecutive school days. Along with a space for the teacher's name and for the beginning and ending dates of the record, the log form provided the

basic information from which the appropriate reassemblies could be made. A number of considerations and procedural details were involved in developing the booklets that need to be described.

Subject areas. Five subject areas were chosen for inclusion in the teacher logs:

Social studies
Science
Language arts
Reading
Math

These five areas were chosen on the grounds that they are universal in elementary schools. Excluded are several additional subjects often (but not always) taught by subject-matter specialists, *viz.*, art, music, and physical education. They were excluded because the instructional reorganization of concern in the MITT study, and the reorganization envisioned by the idea of team teaching and the IGE innovation in which the experimental schools of the study are engaged, focuses on regular classroom teachers and the academic subjects they normally teach.

Our restriction of the data collection to regular grade-level teachers and the academic subjects has an important effect of underestimating the task interdependence in schools of the study, especially that of the throughput variety. Our procedure does not record the interdependence between classroom teachers and the various subject-matter specialists who might be in the school nor does it describe pupilflows between the regular classrooms and various special programs (like bilingual programs, readiness programs, transition classrooms, or programs for the physically or mentally handicapped) when taught by teachers identified as specialists.

The procedure could readily be extended to portray interdependence in its full array in elementary schools, but full description is not germane to the specific purposes of the MITT Project.

The time sample. Teachers were asked to log their instructional contacts with pupils daily for ten consecutive school days. We conceive the two-week interval to be a time sample of all such intervals during a school term (that is, during a period of four-and-a-half months from September through December or January through May). We have no evidence at this point regarding the variability of descriptions in the universe of intervals, but we suspected that the period preceding holidays and end-of-term or year recesses would produce atypical patterns, so an effort was made to avoid such periods in collecting logs. In general, the logs were made in mid-November and late April or early May.

Two consecutive weeks of recording seemed to be an appropriate interval length for the record-keeping process, in that it adequately covers the natural weekly cycle according to which elementary schools normally operate. At the time we chose this interval we were unaware that a three-week rhythm of pupil instruction and regrouping is recommended in the IGE instructional model. Hence, our data must underestimate task interdependence in experimental schools if the model is followed.[4]

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[4]When we became aware of the three-week cycle, we realized that we would have to ask teachers to keep logs for a full month in order to cover the regrouping periods as well as the intervening

We used the *day* as the smallest time-unit for recording instructional contacts, mainly as a matter of convenience to the responding teachers but also because of the difficulty in establishing a smaller unit, like "periods" or "modules", that would be standard across 40 or so elementary schools. The consequence of our choice is that the highest rate of pupil exchange in a measure of instructional interdependence is the instance of two teachers teaching the same subject (to the same pupils) on the same day, which is only a rough approximation of their teaching simultaneously in the same room, our conception of *bona fide* team teaching.

The pupil sample. The purpose of our logging procedures is to determine the task interdependence of teachers, using information about individual pupils only to represent the general pupilflows that connect the teachers. Thus, it is appropriate to sample from the roster of pupils in the school rather than to list the entire school enrollment. Indeed, the latter procedure would have made the teacher logs a forbidding document for teachers to handle in the larger schools. We decided to limit the number of pages of pupil names to five; at 35 names to the page, the longest set of names would be 175.

Pupil rosters were obtained from participating schools shortly

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instructional arrangements. We decided not to extend the interval because of the inordinate demand it would put on the participating teachers. Moreover, while the extended interval would, perhaps, more faithfully display the IGE instructional pattern, it would not add appreciably to a measure of the intensity of instructional interdependence based, as it is, on the *rate* of pupil exchange.

after the opening of school each year. (To prepare the mid-year teacher logs, we merely asked principals, or clerks, to up-date the fall rosters.) Typically, the rosters were arranged by teachers or classrooms when they reached the MITT office, occasionally by "units" or "teams." Using a random procedure, we chose six or seven pupils from each classroom in the smaller schools or five pupils in the larger schools, the exact number determined in part by the closest multiple of 35 that would fill up a page of the teacher log. (The work of preparing and assembling log booklets for each school was rather arduous, and we strove to obtain the largest amount of information we could with the smallest number of pages within the sampling frame employed.) If pupil rosters were arranged by units, or in some other unusual way besides teachers and classrooms, we determined the number of regular teachers assigned to the unit or group and chose the five, six, or seven pupils on a per-teacher basis.

All teachers in the school receive the same list of pupils in their log booklets, clustered insofar as possible by classrooms and by grade level to expedite the effort of teachers in locating the pupils they teach. In our first data-taking operation, however, two or three different pupil lists were prepared for each school (except the very smallest), arranged by grade-level clusters. Thus, a teacher would see in the booklet only names of pupils in grades near the level at which s/he taught. Not only were such booklets difficult to prepare and to distribute to the right teachers, but the date would

systematically underrepresent pupil exchanges between teachers extending beyond two or three grade levels. For these reasons we changed to the single list procedure described.[5]

Excluded pupils and teachers. We have emphasized several times that the concern of the MITT study is with changes in the organization of the regular educational program of grade-level teachers. For this reason, class rosters received from participation schools are closely inspected and held up against the detailed staff rosters showing teacher assignments, to certify that the classrooms are in the main line of the school's grade coverage, and do not represent special programs and classes, like nursery school programs or classes for children with speech or hearing defects. Normally the determination is readily made at the time of the pupil sampling and the preparation of log booklets, but cases that escape this screening can be identified during the reassembly of the returned logs and removed from the tabulations as necessary.

In the initial round of data collection in the spring of 1974, logs were not systematically requested from teachers of seventh and eighth grades, in the eight schools including these levels. The literature on IGE generally envisions a six-grade elementary school as the target of change efforts; moreover, several of the experimental schools of

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[5]We have not yet determined the bias our procedural change introduces between the first data-taking wave and subsequent waves, but a reasonably precise estimate eventually can be made. In any event, the great bulk of the instances of task interdependence we observed in the Time 1 records are within grade levels rather than between levels, even where the booklets list pupils from three or more levels.

the study had explicitly stated expectations to exclude the upper two grades in their implementation plans. We came to regret the exclusion, since subsequently all but one school did, in fact, include them in unit organization. From the second wave of data-taking on, we have systematically collected teacher logs from these levels.

Information reassembly. Once the teacher logs have been completed and returned, they can be reassembled to reveal pupilflows, if any, connecting various sets of teachers. The data for a given school lie in a four-dimensional space: m pupils by n teachers by five subjects by ten days. Hence, there are numerous alternatives for assembling and aggregating the information, and the problem boils down to selecting the ways relevant to one's immediate purpose. Shortly we will illustrate a few ways of describing patterns of instructional organization.

In working toward measures of task interdependence, we have found it useful to construct a teacher-by-teacher matrix for each school, entering for every pair an indication of whether or not they teach *any* of the same pupils and, if so, whether or not they teach them in the same subject, ignoring for the moment the frequency of exchange (the fourth dimension). Then instances of connection in the pupilflow are singled out for measuring throughput and instructional interdependence. Pursuing this approach, we found in the initial data a number of instances of interdependence that hinged on the common teaching of just one pupil, often just once in the ten-day period.

Sometimes these instances seemed attributable to a teacher's error in entering information in the log booklet, and sometimes they appeared to represent some unique circumstance associated with the particular pupil. Inasmuch as our interest lay in general patterns of pupilflow, we established the decision rule that at least two pupils must be taught in common in order to qualify as an instance of task interdependence.

Even ignoring the fourth dimension of *days*, the three-dimensional property space still gives rise to innumerable, occasionally complex, patterns of instructional organization, especially as the pairwise data are extended to encompass all the teachers implicated in what we have come to call *systems* of interdependence. Before describing the indexes of task interdependence used in the present monograph, we will report on some of the patterns uncovered in the Time 1 data and other findings of interest.

Some Initial Findings on Instructional Organization

Here we describe some of the observations regarding systems of interdependence that have emerged from our examination of the teacher logs obtained in the spring 1974 round of data collection. The observations are based on the 29 MITT schools classified as experimental or control by criteria reported elsewhere, less one experimental school from which teacher logs were not obtained. Overall, logs were completed by 380 of the 424 classroom teachers from whom they were requested, a return rate of 90 percent. All of the following observations disregard the frequency data--the rates of pupil exchange--except to determine the

presence or absence of a connection between two teachers; a connection is counted if two teachers teach the same pupil any time during the ten-day period.

Illustrative patterns. The figures accompanying this section are schematic representations of patterns of instructional organization found in one sector or another of the MITT Project schools, which presumably were "conventional" schools at the time the data were collected. The figures show the instructional contact of two- and three-teacher systems with eight (or 12) sampled pupils in each of the five subject areas. The x's represent the presence of an instructional contact at least once during the ten days of logging.

The diagram at the top of Figure 1 represents the self-contained-classroom mode--each teacher teaching his or her own pupils in all the subject areas. It is said to be the standard organization of elementary schools areas. If the diagram were visualized as extending to the right, covering all classroom teachers in the school, and downward to indicate all pupils, it would depict what is said to be the standard organization of elementary schools in the country. Proponents of various innovative plans almost invariably couch the advantages of their proposals against the shortcomings imputed to the standard organization. Our data suggest, however, that proponents who make the contrast today may be setting up a straw man: only one of the schools investigated by MITT researchers fully corresponded to the so-called standard. The percentages of classroom teachers in a

Figure 1. Two-teacher patterns of instructional organization.

(a)

Pupil	Teacher A					Teacher B				
	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1	x	x	x	x	x					
2	x	x	x	x	x					
3	x	x	x	x	x					
4	x	x	x	x	x					
5						x	x	x	x	x
6						x	x	x	x	x
7						x	x	x	x	x
8						x	x	x	x	x

(b)

Pupil	Teacher A					Teacher B				
	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1		x	x	x	x	x				
2		x	x	x	x	x				
3		x	x	x	x	x				
4		x	x	x	x	x				
5		x				x		x	x	x
6		x				x		x	x	x
7		x				x		x	x	x
8		x				x		x	x	x

(c)

Pupil	Teacher A					Teacher B				
	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1	x	x	x	x	x					
2	x	x	x		x				x	
3	x	x	x	x	x					
4	x	x	x		x				x	
5				x		x	x	x		x
6						x	x	x	x	x
7				x		x	x	x		x
8						x	x	x	x	x

Key:

SS - Social studies
Sc - Science
Ma - Math
Rd - Reading
LA - Language arts

school who individually were in the self-contained mode ranged from a high of 88 percent (apart from 100 percent in the one school) down to one school at 6 percent and another with no teachers at all in the self-contained mode; 50 percent was the median of the 28 experimental and control schools. The MITT sample, of course, cannot be construed as a truly random, or representative, sample of the nation's elementary schools, but the rarity of the fully self-contained-classroom pattern in our data is sufficient at least to raise a question about the propriety of referring to it as the standard.

The next diagram (b) in Figure 1 shows a pattern in which two teachers exchange teaching assignments, one teacher teaching all of the pupils social studies, including his or her own, and the other teaching all of them science. There is a division of labor by subject-matter (each teacher "teaching to his or her strength") and they are linked in a system of throughput interdependence by virtue of the exchange. In patterns of this and some other varieties it is fairly easy to determine whose pupils are whose by inspecting the predominance of the teaching contacts, but in certain of the more complex patterns we have identified in the data, pupils cannot be regarded as "belonging" to any one teacher or classroom. (There may be "homeroom" or "home teacher" assignments in such cases, but our data-taking procedure does not detect them.)

Another instance of throughput interdependence between two teachers is depicted in (c), but one without a subject-matter division

of labor. Both teach reading, but they have regrouped their pupils according to some consideration or criterion, perhaps on grounds of a test of reading ability; each teaches one of the sub-groups. Patterns like this can become highly intricate when the regroupings are extended to more subject areas, even when only two teachers are implicated in the system.

Figure 2 depicts three-teacher systems of throughput interdependence, the first one essentially an extension of the two-teacher pattern of (b) in the preceding figure. Here the subject-matter division of labor involves social studies, science, and math, with each teacher teaching "his or her own" pupils in reading and language arts. If the principle of the extension were carried to a five-teacher system, with the addition of specialists in reading and language arts, the instructional organization would represent what some would call departmentalization. We found only one fully departmentalized pattern in the MITT Project schools, and that in one sector of a school that had been unitized for several years (and hence not among the experimental and control schools).

The second pattern in Figure 2 represents a rather more common organizational mode where only one teacher of the set of three is truly a specialist (shown here as specializing in social studies). It illustrates the interesting case of a system in which two teachers (A and B) are not linked *directly* in throughput interdependence, only indirectly by virtue of their separate linkages with Teacher C.

Figure 2. Three-teacher systems of throughput interdependence.

(a)

	Teacher A					Teacher B					Teacher C				
Pupil	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1	x			x	x	x							x		
2	x			x	x	x							x		
3	x			x	x	x							x		
4	x			x	x	x							x		
5	x					x			x	x			x		
6	x					x			x	x			x		
7	x					x			x	x			x		
8	x					x			x	x			x		
9	x					x							x	x	x
10	x					x							x	x	x
11	x					x							x	x	x
12	x					x							x	x	x

(b)

	Teacher A					Teacher B					Teacher C				
Pupil	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1		x	x	x	x						x				
2		x	x	x	x						x				
3		x	x	x	x						x				
4		x	x	x	x						x				
5		x	x	x	x						x				
6		x	x	x	x						x				
7						x	x	x	x		x				
8						x	x	x	x		x				
9						x	x	x	x		x				
10						x	x	x	x		x				
11						x	x	x	x		x				
12						x	x	x	x		x				

We show Figure 3 primarily to illustrate an instance of instructional interdependence (Teachers A and B teaching the same pupils in reading) rather than just throughput interdependence of the preceding figures, but also to indicate that mixtures of throughput and instructional interdependence sometimes occur in the same system. While it schematizes a pattern actually observed in the data, it should be apparent that details of the mode and mixture can vary in almost limitless ways, defying easy characterization.

Specific findings. The following observations of the incidence of task interdependence in the 28 experimental and control schools are based on data like those in the foregoing diagrams, assembled differently, though, for ease of analysis. Here we invoke the decision rule that two teachers must teach at least two common pupils in order for the pair to be interdependent. This is still a weak definition, as it was in the preceding section, since a teacher could instruct another teacher's (two) pupils just once in the two-week interval, yet qualify the pair as interdependent.

1. Instructional interdependence is a comparatively rare event. Counting pair-wise across schools, there were 38 instances found amo[illegible] the 380 reporting teachers and over three times as many instances of throughput interdependence. The majority of the teacher-pairs in instructional interdependence share pupils in just one subject, although two

Figure 3. Mixture of throughput and instructional interdependence in a three-teacher system.

Pupil	Teacher A					Teacher B					Teacher C				
	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA	SS	Sc	Ma	Rd	LA
1	x	x	x	x	x				x						
2	x	x	x	x	x				x						
3	x	x	x	x	x				x						
4	x	x	x	x	x				x						
5						x		x	x	x		x			
6						x		x	x	x		x			
7						x		x	x	x		x			
8						x		x	x	x		x			
9						x						x	x	x	x
10						x						x	x	x	x
11						x						x	x	x	x
12						x						x	x	x	x

teacher-pairs cover all five subjects together, as detailed by the following tabulation:

Number of subjects	Number of teacher-pairs
1	24
2	5
3	4
4	3
5	2

Thus, if team teaching refers to joint instruction in "all or a significant part" of the curriculum areas, it was a rare event indeed in the MITT schools at Time 1. No one subject was favored for joint instruction, incidentally, although it was somewhat greater in science and social studies than in math and reading. The small number of instances do not allow much stock to be put in this observation though.

2. Most instances of interdependence, throughput or instructional, occurred between teachers at the same grade level (65 percent) or at adjacent grade levels (25 percent). Tabulations are shown in Table 1. Because of procedures used in the first round of data-taking mentioned earlier, these figures may underestimate modestly the grade-level spread of task interdependence. In larger schools, teachers were asked to log their contacts only with a grade-level cluster of pupils, *e.g.*, primary level or intermediate level, thus constraining the possible spread, especially for teachers at the boundaries.

The tallies also show that instances of interdependence progressively increased from kindergarten and the first grade to a peak in the fifth and sixth grades. (Data were not systematically taken from seventh- and eighth-grade teachers.) Interdependencies within and between the

TABLE 1. Grade Levels of Task Interdependent Teacher-Pairs, MITT Experimental and Control Schools, Spring 1974

	Grade Level*												
Grade Level*	K	1	1-2	2	3	4	4-5	5	5-6	6	7	8	Sum
K	6	1	-	-	1	-	-	-	-	-	-	-	8
1		3	-	1	-	-	-	-	-	-	-	-	4
1-2			-	2	2	-	-	-	-	-	-	-	4
2				17	3	-	-	-	-	-	-	-	20
3					19	-	-	1	1	-	-	-	21
4						22	-	7	-	1	-	-	30
4-5							-	1	-	1	-	-	2
5								15	2	22	1	1	41
5-6									-	3	-	-	3
6										25	1	1	27
7											-	1	1
8												-	-
Sum	6	4	-	20	25	22	-	24	3	52	2	3	161

*Combinations like 1-2 represent split classrooms.

fifth and sixth grades accounted for close to half (42 percent) of the total.

3. Task interdependencies occur predominantly as two-teacher systems. While indirect linkages between teachers occasionally make it difficult to distinguish and count "systems" of four or more teachers, we found over half of the 68 systems to involve only two teachers and another one-third to be three-teacher systems. (The second diagram (b) of Figure 2 illustrated an indirect linkage.) In one school, however, there was an intricate seven-teacher system among fifth- and sixth-grade teachers, and in another a six-teacher system involving teachers of the first, second, and third grades.

System size	Number of systems
2	37
3	23
4	6
5	1
6	-
7	1

Only in a few schools did the systems appear to follow a school-wide plan. The smaller systems tended to arise more or less indiscriminately across the school, a pair of teachers here and a trio there, without obvious patterning. They seemed to be spontaneously emergent phenomena, depending on the happenstance of the teachers who were in neighboring classrooms. The larger systems usually would be present in one sector of a school (most often in the intermediate grades) but not in another. Furthermore, where a larger system occurred, say among four teachers of the fifth and sixth grades, typically there would be several

teachers of the same grades who remained outside the system, suggesting an element of voluntarism in the organizational arrangement. In short, one would be hard pressed in most cases to characterize a *school* as having one kind of instructional organization as opposed to another. It will be interesting to see if this changes in the experimental schools of the MITT study by virtue of their commitment to an instructional innovation.

4. Although a subject-matter division of labor was common in the throughput-interdependent systems, teacher *specialization* by subject was rarely observed in the schools. The concept of specialization requires us to turn attention from the distribution of activities across a set of teachers to the individual teacher and the distribution of his or her activities, since specialization can be said to occur when the teacher teaches in one and only one subject area. (Division of labor does not necessarily imply specialization, but specialization cannot occur without a division of labor.) By another reassembly of the teacher log data, we arrived at the following figures showing the number of teachers who taught one to all five of the subjects.

Number of subjects taught	Number of teachers
5	239
4	56
3	41
2	31
1	13

Just three percent of the 380 teachers specialized in a single subject, while the large majority was in the image of the "omnicompetent" teacher, covering all subjects of the curriculum.

The Indexes of Task Interdependence

Two indexes of task interdependence were developed for purposes of the present report, one for the extent of throughput interdependence in a school, the other for the extent of instructional interdependence. They entailed a simple count of the number of teacher pairs in task interdependence, noted by p_t and p_i respectively. As in the preceding section, an instance of throughput interdependence was counted when two teachers taught at least two pupils in common, but in different subjects, and an instance of instructional interdependence when the teacher-pair taught at least two pupils in common in the same subject area or areas. The number of days on which the common teaching occurred, or the number of pupil exchanges, was disregarded for the present measure: it could occur at any time during ten consecutive school days and need occur no more often than once. Given this base, the indexes reflect the extensity of task interdependence in a school.

To be useful for comparisons among schools, however, it is necessary to take account of differences in school size, or at least in numbers of reporting teachers. It is obvious that more instances could be expected in larger schools; we found modest relationships between the n of reporting teachers and instances of interdependence, a correlation of .48 for p_t and .24 for p_i, based on all 39 schools of the MITT study for which data were available.

Less obvious though is what an appropriate correction factor for size would be. Our first thought was to use the total possible pairs of teachers as a base value, dividing p_t or p_i by $n(n-1)/2$, and in fact

we computed such scores. The problem with this is that the denominator of the ratio increases as a power of school size and the ratio value for larger schools become inordinately small. The total possible pairs in a 10-teacher school, for example, is 45, in a 20-teacher school, 190, and in a 30-teacher school, 435. Larger schools suffer from using such divisors. Correlations of interdependence scores based on them and the *n* of reporting teachers were negative and distinctly curvilinear. From a conceptual standpoint, the total possible pairs in a school is an unrealistic base value for an index. It assumes that all of the teachers in a school would conceivably be implicated in a single system of task interdependence--that all teachers would teach all pupils.

More realistic would be a denominator that recognized the formation of systems around subsets of teachers and pupils. In reaching it we reasoned as follows. Given the practical realities of organizing and operating instructional teams and given our measuring procedures that set the upper limit of subject specialization at five, it is unlikely that more than *five* teachers would be implicated in a fully interdependent system. Five teachers represent 10 pairs. Thus, for every five teachers in a school 10 pairs could be formed, or 10(n/5). More simply, the denominator value is 2n, where *n* is the number of teachers furnishing logs.[6]

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[6]Our computational procedure implies the use of decimals in determining system size and numbers of possible pairs, a patently absurd approach where people are involved. We conceived other procedures that used whole numbers, but they produced index values negligibly different from this computationally simple approach.

The indexes of throughput interdependence (TPI) and instructional interdependence (INI) are.

$$TPI = p_t/2n$$

$$INI = p_i/2n$$

The six- and seven-teacher systems we observed in the Time 1 data obviously are beyond the assumed maximums of system size, but they do not pose problems for the ratio values. The presence of large systems, when well connected, only means that the index values may exceed 1.0.

The indexes do not remove the effects of differences in numbers of reporting teachers altogether, at least not the TPI index. The correlation of TPI and n (over all 39 schools) was .35 and essentially linear. For INI the correlation was -.05. Our interest, of course, was not to make an exact adjustment but to avoid an overcorrection; the correlation of throughput interdependence with n, an approximate indicator of school size, may be a legitimate relationship.

Task interdependence in unitized schools. TPI and INI indexes were calculated for the seven MITT schools which were found already to have unitized managerial structures in the spring of 1974 and, hence, could not be classified as experimentals or controls in the study design. A comparison of the indexes with TPI's and INI's for the 13 control schools is made below. We hesitate to call the comparison a test of the construct validity of the indexes, because it would require us to assume a strong relationship between the school's managerial structure and its instructional organization--a relationship that is questioned by the MITT study. Nonetheless, the computations show substantially greater task

interdependence in the unitized schools than in the control schools at Time 1.

	TPI	INI
Unitized (N = 7)	.621	.201
Control (N = 13)	.139	.047
Difference	.482	.154

The differences are significant at or beyond the .01 level by a two-tailed t test. Thus, the indexes clearly differentiate between the sets of schools with contrasting managerial forms.

APPENDIX B

Control Structure in Elementary Schools: Measurement and Findings

Much of the literature on formal organizations focuses sharply on issues relating to the control of the organization and those who occupy it. Control structure typically refers to the standardized or patterned means by which the behavior of an organization and its various members are regulated.

In one respect, control is exerted by the organization's environment. Where organizations vie, their behavior is governed by strategies and rules of competition. Where market controls are less prominent there is often greater effort devoted to commit the organization to comply with state and national regulations. Public schools fall into the latter category. They are "sole source contractors" in a given locale and report more or less continuously on their compliance with multitudinous state and federal regulations.

Within their boundaries, organizations generate a second set of compliance requirements. These are necessitated by the fundamental nature of organizational work; the recombination of various inputs to form a new, socially desirable result. The recombining requirement gives rise to various organizational structures which, depending on the nature of inputs, technology and products, serve to distinguish between and among different organizations.

Although there exists considerable variation among organizations of the same and different types, all can be depicted at a very abstract level as having the same control structure elements. These include generating the

means by which the contributions of each unit, individual, group, department, branch, or subsidiary, are specified, often in advance, evaluated and rewarded. We have chosen to call these three elements norms, surveillance and sanctions (Packard, Bierly, DeFlaminis, and Gaughen, 1973).

Norms are rules for behavior spelling out in various degrees of specificity what a unit must do in order to make an acceptable contribution to the organization. Some of these norms are explicit, codified in organizational documents and made prominent. Others are implicit and, while they may go unrecorded, actively shape patterns of individual and collective behavior. Surveillance refers to actions taken to monitor if and how norm compliance occurs. Surveillance also has formal as well as informal dimensions. Sanctions are actions taken as a result of surveillance activities. If contributions are acceptable or superior, then the organization often provides rewards of comparable symbolic value. Should contributions fall below certain levels various rewards may be withheld, privileges suspended or punishments invoked.

These basic elements, norms, surveillance, and sanctions apply to internal organizational control as well as to societal control of organizations.

The focus of our study of control in schools directs attention to the internal control structure of the school. The internal control structure stresses means more than ends, and particularly implicates the behavior of teachers, the most abundant employee. Furthermore, our interest in the internal control structure of the school centers directly on its official norms and excludes consideration of surveillance and sanctions.

The Control Structure of the School

The basic unit of the school's control structure is the single decision. A decision is the result of a deliberate undertaking. It pertains to an issue and the choice among alternate courses of action. The choice is made by the decision-maker(s) who constitute the input population. The choice is the decision, the selected alternative. Most decisions set, or imply directly, expectations for the behavior of one or more persons. Those whose behavior is so implicated constitute the output population.

The entire series of decisions and their attendant input and output populations are the basic units of the school's control structure.

Pertinent to this study are those decisions with direct implications for the instructional behavior of teachers; that is, where teachers constitute the output population. The main features to be ascertained are identity of the members of the input and output populations and the decision issues. The relation of input and output population members describes the school's control structure.

This perspective leads, in figure 1, to the identification of decision types based on features of the input and output populations. Here each UPPER CASE letter represents a member of the output population. (For our purposes, output members are always and almost exclusively teachers.) Each lower case letter represents a non-member of the output population.

Figure 1: Symbolic Representation of the Control Structure of the Decision

Decision Type	Sample Code
	Input Population:Output Population
Collegial	ABCD:ABCD
Leader Determined	A:ABCD
Shared	aABCD:ABCD
Removed	a:ABCD

For the collegial decision a case has been represented where all members of the output population are the only persons in the input population. The group (of teachers) rendered a decision for themselves alone. For collegial decisions population size must equal at least two members and each population must be comprised exactly of the same members. Thus, the codes AB:AB, ABCDEF:ABCDEF, etc. also represent the collegial decision.

The leader determined decision departs importantly from the collegial variety. Here some but not all output population members comprise the input population; thus the descriptor, leader determined. The only other restriction placed on the leader determined decision is that the output population must have at least two members. Otherwise the absolute size of either population is irrelevant. The input side must have at least one fewer member than the output side. (With large populations, 4 or more members, the distinction between leader determined and collegial decisions may seem rather arbitrary. This case does not occur frequently enough to warrant concern.)

The shared decision is distinct from the two prior types in that a, a non-member of the output population, perhaps the school principal or counselor, is also depicted as a member of the input population. The codes aA:A and aABCDEF:ABCDEF are also classified as shared decisions. (In the latter example once again the distinction between the collegial and shared decision might seem rather arbitrary. We think not. Even at such a fine level of discrimination the differences in input populations between the two types constitute an important difference in governance.)

The removed decision is quite distinct from any of the foregoing types. Here no member of the output population participates in the input population. In schools such decisions are often made internally by the principal or central office supervisor and externally by the school board or state powers.

A decision has a control structure when for any member of the output population someone in addition to or other than himself is a member of the input population. There is a fifth type of decision not included in Figure 1 for the reason it has no control structure. It is called discretion and can be represented symbolically as A:A. Here a person constitutes solely both the input and output populations. Discretion departs significantly from the collegial decision in that the decision is not shared with any other person.

To this point it has been indicated that the basic unit of a school's control structure is a single decision, that decisions center around selecting among alternative courses of action regarding an issue, and that for each decision an input population makes the choice and an output population is governed by the choice. Further, it has been indicated that variations in input and output populations and their correspondence reveal five decision types: collegial, leader determined, shared, removed, and discretion.

This depiction of control structure departs from conventional approaches in a few simple but useful ways. First, it is equally applicable in schools that have different governance structures. It is not tied to nor does it beg particular or specialized decision making entities. Second, inclusion of and reference to the identity of output population members in determining decision type describes quite directly the state of centralization/decentralization in a school. Third, in longitudinal studies various vectors of change can be described simultaneously. For example, in schools that adopt a unit formation two alterations are expected; group participation in decision making should increase with a corresponding decrease in teacher discretion.

While it is expected that schools will differ in terms of the prominence of decision types, it is also expected that different issues will call forth varying decision types.

Teacher Task Areas. In order to measure adequately the alterations in school control structure, it was necessary to identify a network of instructional issues about which decisions would be made more or less continuously and deliberately. These issues include decisions of a school-wide or inter-classroom nature as well as those of an intraclassroom nature.

The instructional issues of the school can be adequately described in terms of a variety of teacher task areas. Here teachers are, by necessity, members of the output population. Moreover, some of the task areas touch mainly upon events of a school-wide nature; that is, they involve the control and coordination of interclassroom events, particularly resource and task interdependence. Other task areas are pertinent by and large only to the in-

dividual classroom. Here decisions do not implicate, at least on a short term basis, other classrooms or teachers. Figure 2 displays the various task areas and their school-wide and classroom issues. These task areas were chosen to cover comprehensively the major instructional affairs of the school.

Figure 2 shows, in the left-hand column, 7 teacher task areas. Imbedded in these teacher task areas are instructional issues of a school wide nature, shown in the center column, and instructional issues of a classroom nature, shown in the right-hand column.

Defining the control structure of a school as done here indicates that the measurement device must be capable of determining if a decision has been made about the issues displayed in Figure 2, and, if so, the measurement device must be capable of determining the memberships of the input and output populations.

Control Structure Interview

There are essentially two ways in which a researcher can obtain relatively objective accounts of the identity of the decision-makers. The first is to be present when a decision is rendered and record who participated in selecting the eventual alternative. This approach has its drawbacks. Since decisions are made frequently, the observer must be present on a continuous basis, much like an anthropological field worker. Consequently, when a number of settings are involved the cost of supporting enough field workers soon becomes prohibitive. Short of continuous contact, the observer may appear when many decisions are liable to occur within a short span of time. Often these are official, if not public, events--faculty, committee or board meetings.

Figure 2: Teacher Task Areas Including Their School Wide and Classroom Issues

TEACHER TASK AREA	SCHOOL WIDE ISSUES	CLASSROOM ISSUES
1. SUBJECTS TAUGHT	*Subjects in which lessons are presented on a regular basis.	*Daily lessons.
	*Subjects in which lessons are prohibited.	*Daily subject schedule.
2. TEACHING MATERIALS	*Materials usually found in the school.	*Materials used in the classroom.
	*Materials whose use is prohibited.	
3. METHODS OF INSTRUCTION	*Methods whose use is restricted.	*Methods used in the classroom.
4. METHODS OF REPORTING PUPIL PROGRESS	*Methods used during the year.	*Frequency with which methods are employed.
5. RESPONSES TO MISBEHAVIOR	*Responses whose use is prohibited.	*Responses used.
6. STUDENT GROUPS	*Special class characteristics.	
	*Number of class members.	
	*Grade of class members.	
7. HIRING	*Number of teachers.	
	*Necessary requirements for employment.	
	*Desirable traits in a candidate.	

Observations would be biased against decisions where teachers alone constitute the input population.

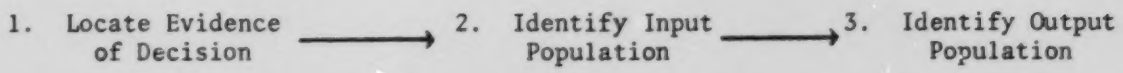
The second approach is to replace the observer with an informant; that is, a regular member of the social system of interest. One qualifies as an informant by being close to the decision makers, if not a decision maker him- or herself and by virtue of sustained membership in the system. If informants can be located, two choices are available to the researcher. On the one hand, the informant can be trained in the skills of recording and reporting observations. On the other hand, the informant can be probed regularly and systematically to elicit the details of his or her knowledge about decision making. The first alternative seems more problemmatic than the second. The costs of training and supervising informants can run very high. Furthermore, it seems unwise to give a key organizational member an intimate account of research purposes and procedures.

The interview which will be described next relies on multiple informants in each school. They are interviewed by trained interviewers from outside the school. In this way costs are kept at a reasonable level and the problems of training, supervision, bias and reactivity are not as great as they would be if the other alternatives had been chosen.

The Structure of the Interview. Data collection departs in two major ways from standard approaches to studies of decision making. The first step of the process is designed to gather evidence to certify which decisions had been made in each particular setting. Once this evidence is secured the interviewer then probes not only to discover who made each decision, but also

whose behavior is governed by the decision--the identity of the input and output populations. Note the following general schema.

Figure 3: Diagram of the Interview Structure



Data are collected in two stages. Evidence obtained by a self-administered questionnaire given prior to the interview. In the interview proper, the interviewer poses a standard series of questions to each informant about the data that were provided. The following summarizes operations in each stage.

Stage One: Evidence. Approximately two weeks prior to the point when an interview is to be held, the interviewer contacts the preselected respondent by phone to explain the purpose of the study and to arrange a time and place for the interview. The interviewer tells the potential respondent that s/he will receive by mail a questionnaire designed to collect certain standard information about the respondent's classroom and school. After achieving cooperation and, mutually agreeable schedules, the interviewer than sends the self-administered questionnaire to the informant.

The questionnaire is designed to tap each teacher task area and each issue within the task area. For example, in the task area "subjects taught" the respondent is shown a list of 25 subjects normally presented in elementary schools. S/he is then instructed to indicate (1) whether s/he has

recently taught any of these or any other subjects and (2) which subjects s/he has been asked not to teach. If the informant indicates s/he teaches math, it is assumed a decision was made that s/he would teach math. If s/he has been asked not to present lessons in sex education, we assume a decision against sex education had been rendered. The absence of affirmative evidence (e.g., something not offered, or not prohibited) does not indicate a deliberate decisional process.

A sample of one section of the self-administered questionnaire is provided in Figure 4. The section shown pertains only to Task Area 1, subjects taught. Other task areas are covered in a similar fashion with other sections of the questionnaire. In the example, only columns 1 and 2 call for informant responses. In the interview, probes are made about the daily content and schedule of lessons (columns 3 and 4) and subjects that are taught (column 1).

Stage Two: Input and Output Populations. Following the completion of the self-administered questionnaire, the interview is held. During this stage the interviewer adheres to the completed copy of the self-administered questionnaire which contains the evidence for the decisions about which probes will be made.

The interviewer goes over each section of the completed questionnaire to assure that it is accurate to the informant's satisfaction. Once done the interviewer begins to probe decisions that lie behind each piece of affirmative evidence. The respondent is given two cards. On the first is a list of locations where decisions pertinent to a particular bit of evidence could be made.[1] On the second is a list of possible, but not exhaustive, in-

[1] Locations on CARD 1 include outside your school, within the administration of your school, within the teaching staff of your school, within yourself.

Figure 4: Sample Section from Self-Administered Questionnaire*

CHART 1

	Subjects	COLUMN 1 Q. 1 Subjects taught YES	NO	COLUMN 2 Q. 2a Asked not to teach YES	NO	RESPONDENT: DO NOT USE THESE COLUMNS. COLUMN 3 Lessons	COLUMN 4 Schedule
SP	Spelling	20 1	2	45 1	2		
RD	Reading	21 1	2	46 1	2		
LA	Other language arts	22 1	2	47 1	2		
FL	Foreign language ..	23 1	2	48 1	2		
MA	Mathematics	24 1	2	49 1	2		
SS	Social studies	25 1	2	50 1	2		
SC	Science	26 1	2	51 1	2		
US	U.S. history	27 1	2	52 1	2		
WH	World history	28 1	2	53 1	2		
GE	Geography	29 1	2	54 1	2		
HE	Health	30 1	2	55 1	2		
AR	Art	31 1	2	56 1	2		
MU	Music	32 1	2	57 1	2		
PE	Physical education	33 1	2	58 1	2		
SE	Sex education	34 1	2	59 1	2		
		Q. 1a Others taught		60-61 62-63 64-65 66-67			
	58-59			1	2		
	57-58			1	2		
	59-60			1	2		
	61-62			1	2		
	63-64			Q. 2b Others asked not to teach			
	-- 68-69					--	--
	-- 70-71					--	--
	-- 72-73					--	--
	-- 74-75					--	--

*The copy shown in this figure has been photo-reduced for convenience of display.

put (or output) populations.[2] The interviewer then asks about a given bit of evidence (1) where decisions that pertain to it were made--CARD 1, (2) who made each decision--CARD 2 and (3) who was governed by each decision--CARD 2. The interviewer adheres also to a prepared code book which is placed beside the self-administered questionnaire, exposed to the informant and used to record the responses. In the interviewer's code book there are a series of standard questions to be posed about each column of each chart of the self-administered questionnaire (see the sample chart in Figure 4). Thus equivalent data is collected in a highly systematic fashion for each teacher task area.

Questions about the location of a decision (CARD 1) are included for a variety of reasons. By first establishing the locus, both informant and interviewer are alert to certain types of input and output populations. For example, should the informant say the decision was made outside the school and then report it was made by members of the staff, the interviewer would regard these as incompatible facts and probe further into the informant's report. Moreover, location is used in justifying the final codes given during data reduction. Should the locus and population information not correspond, for example, coders may listen to an audio tape copy of the actual interview, if it is available[3], or search for more complete information provided in notes made

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[2]Populations on CARD 2 include a series of out-of-school personnel, your school principal, all teachers in your school, only some teachers in your school, only yourself and others. For final coding these broad categories are further refined to include a broad range of particular positions and groups that might be present in each school and district, e.g., team, team leader, grade-level committee, district committees and so on.

[3]Informants may elect not to have the interview taped.

during the interview. Should each of these procedures fail to explain the apparent incongruity, the interviewer is contacted and, in extreme cases, so is the respondent.

Figure 5 is a copy of a segment of the interviewer's code book used during the interview. This particular sample follows directly column one of chart one, subjects taught, which is displayed in Figure 4.

When an interviewer has completed the full cycle of questions for one complete chart, that is, for one teacher task area, s/he asks "Are there any other important decisions which have been made in (this teacher task area) which you feel we have not covered." Should a decision be uncovered, the entire cycle of probing evidence, locus and population identification is repeated. Accordingly there is a separate code sheet for each of these "loose ends" probes for the various teacher task areas.

Respondent Sample. Two kinds of informants are sought in each school. Teachers who are likely to know who makes what decisions by virtue of their experience, position, tenure, and prestige in the school are preferred over others. The principal of the school is also interviewed due to his rather close proximity to decisions from which teachers are typically further removed. The principal interview and questionnaire are not illustrated here. They differ only insofar as slight modifications of wording are required to direct the principal to consider decision making from a teacher's rather than an administrator's perspective. Additionally, the area of hiring is included only on the principal's survey.

For the first wave of data collection a sample of informants was drawn randomly so that no more than nine teachers and the principal were in-

Figure 5: Sample Section from the Interviewer's Code Book

Let's look at decisions about what subjects you have taught.

Chart 1, Column 1
- B. (From CARD 1) Where were decisions made that (SUBJECT) would be taught?
- C. (From CARD 2) Who made that decision?
- D. (From CARD 2) Who was governed by that decision?
- F. Were any other subjects determined in exactly the same way? Which ones?

	A	B	C	D	E	F
	Subjects	Where decision is made (CARD 1)	Who makes decision (CARD 2)	Who is governed (CARD 2)	Specify (CARD 1, Code 6; and CARD 2, Codes 4 & 6)	Others determined the same way
1			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
2			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
3			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
4			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
5			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
6			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
7			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
8			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
9			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		
10			1 2 3 4* 5 6* 7	1 2 3 4* 5 6* 7		

Where decision is made (CARD 1)

1. Outside your own school
2. Within the administration
3. Within teaching staff
4. With self
5. Don't know
6. Others within your own school*

Population (CARD 2)

1. Education personnel outside school
2. School principal
3. All teachers in school
4. Some teachers in school*
5. Self
6. Others*
7. Don't know

* SPECIFY WHO IN COLUMN F.

-5-

terviewed in each school. This approach was followed due to the lack of information which would identify "best" informants. On subsequent data collections following acquisition of a great deal of information about each of the members of every faculty, a smaller number of teachers was selected largely from the original sample who best fit the informant criteria listed earlier.

Performance Norms. Each teacher informant goes through the entire cycle of questions pertaining to the first six teacher task areas (see Figure 2). During the first data collection total interview time ranged from 40 to 150 minutes. Mean completion time was 75 minutes. Completion time for principals during the first interview ranged from 35 to 155 minutes. Their average was 89. Principals are probed over seven task areas. During the second data collection interview time was shortened considerably for teachers but not for principals.

Completion time has been the greatest practical difficulty with the data gathering procedure. During numerous field trials conducted initially in Oregon and subsequently at the Institute for Survey Research at Temple University, Philadelphia[4], efforts were made to make the interview more efficient without greatly sacrificing the richness of detail it produces. Pruned during this period was a section on determining the contents of pupil progress reports in that respondents could not explain briefly and succinctly how grades and other evaluations were determined.

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[4]Concern for the magnitude of the tasks of training and supervising interviewers prompted staff members to subcontract for the data collection and reduction activities with this organization. Project leader there, Dr. James Peterson, also had responsiblity for putting the interview in final form including most pertinently the format of the various protocols.

Effort was made to assess inter-interviewer agreement by having different interviewers probe the same respondent on the same task areas.[5] Inter-interviewer agreement was disappointing in early trials, particularly at the evidence gathering stage, which, in large measure, shapes much of the subsequent interview and resultant data. Interviewers were not, it turned out, especially systematic during this stage and were highly subjective in recording evidence, especially for subjects presented, materials used, and responses to misbehavior. When this stage of the interview became more highly structured inter-interviewer agreement on this and other subsequent sections rose to satisfactory levels.

During the development of the measure, error variance seemed to be tied more to differences among interviewers than among the informants. Considering the massive scale at which data eventually would be collected, systematic, rigorous training and on-the-job supervision of interviewers became the primary concern. Thus, a working agreement was struck with the Institute for Survey Research, ISR.

Under this arrangement, interviewers are recruited from the locale of the schools in which they conduct their interivews. They are trained together both in large groups and on an individual basis. They are supervised not only on the degree to which proper procedures are followed but also on the basis of data they return. In addition, many of the interviews are recorded

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[5]Such efforts were made during the development of the protocols in Eugene. Due to the length of the interview, especially at that stage of development it was not feasible to conduct the entire interview with the same informant two or three times in the same day. Thus a rotation scheme was enacted wherein three interviewers probed in the same day four and five informants on a few task areas such that each informant was interviewed twice on the same task area by at least different interviewers.

on audio tapes which are spot checked regularly by field supervisors. Other problems associated with the interviews and interviewers are reported directly to the project offices in Eugene and fed back to ISR. In some cases interviewers have been removed from their duties and replaced with other trained personnel.

Evidence certifying instrument capabilities prior to the collection of "experimental" data was incomplete especially in regard to validity. This shortcoming was due in part to the demands of the data collection schedule. Nonetheless, sufficient modification in instrument format and interviewer training had been made to assure rather high levels of consistency and accuracy. Also, questions of instrument validity could be answered best when considerable information about other school characteristics became available; that is, after the first collection of all data.

These analyses of the control structure data are of the most simple variety. Reported are percentages of decision types. In calculating the values, the total number of decisions reported across all schools or among schools of a given type becomes the denominator of the fraction. The numerator then is the total number of decisions of each decision type. The five basic types of decisions are described in Figure 1 and the discussion surrounding it.

Preliminary Findings

Thirty-six elementary schools in the MITT sample fall into three groups: (1) experimental, those which installed a unit organization in the fall of

1974, (2) control schools that did not install a unit organization and (3) unit, those which had installed a unit organization previously. The unit structure has been shown to produce greater group decision making over both class and school issues.

The first round of control structure data taken in the spring of 1974 was expected to reflect high frequencies of decisions of the type discretion for classroom issues and removed in school-wide issues. But unit schools were expected to exhibit relatively higher frequencies of collegial decisions than their counterparts. More particularly, unit schools should show lower frequencies of discretion in class issues and removed decisions in school issues than the other schools.

The control structure data satisfies these expectations. It should be noted, however, the separation of decisions into classroom and school-wide issues is imperfect and serves, we believe, to depress differences among schools. More fine grained analyses are planned (but not reported here).

Teacher Reports. When aggregating teacher responses from 36 schools over classroom and school issues, 46 percent of the reported decisions are of the type discretion, 30 percent are removed and roughly 10 percent each are collegial and shared. These are shown in Table 1.

Table 1: Control Structure over all Sample Schools

DECISION TYPE	Class and School Issues Combined Percent	Class Issues Only Percent	School Issues Only Percent
Collegial	11	10	13
Leader Determined	03	02	04
Shared	10	06	16
Removed	30	17	47
Discretion	46	65	21

Among classroom decisions, discretion, by a large margin, is the dominant response. Low values on each of the other types also give a much expected picture. The same is true also of decisions reported about school wide issues. Here nearly half the decisions are of the type removed, made by non-teachers. Yet there remains a rather large residual of discretion. This later observation may be exaggerated somewhat by the rough way in which decisions were placed in the school issues category.

These same patterns were repeated, although not at the same levels, among each of the three groups of schools that comprise the total sample. Table 2 contains findings for the control structure of classroom issues by school type.

Table 2: Control of Classroom Issues by School Type

	SCHOOL TYPE		
DECISION TYPE	Experimental Percent	Control Percent	Unit Percent
Collegial	09	06	19
Leader Determined	02	02	02
Shared	05	07	06
Removed	15	20	13
Discretion	69	66	58

As expected, unit schools (those unitized prior to the first wave of data collection) report higher levels of collegial and correspondingly lower levels of discretion decisions than either of the other types. Moreover, the small differences between the experimental and control schools are also suggestive. Higher levels of collegial decisions and lower levels of removed decisions in the experimental schools suggest anticipatory shifts in the control structure may have preceeded the installation effort.

Table 3 presents parallel findings about school wide issues. The unit schools show relatively higher levels of collegial decision making and correspondingly lower levels of decisions of the type removed. The experimental schools again display what may be an anticipatory shift in control structure.

Table 3: Control of School-Wide Affairs by School Type

DECISION TYPE	SCHOOL TYPE Experimental Percent	Control Percent	Unit Percent
Collegial	11	07	21
Leader Determined	04	03	05
Shared	13	20	12
Removed	48	51	42
Discretion	24	19	21

To the extent internal consistency logic applies to a measure of phenomenon of this sort, the correlations between reports of decisions within the five types across classroom and school-wide issues are positive and moderate to large (upper right quadrant of Table 4). The lowest within type, across category correlation is .31 for leader determined decisions and the largest is in the collegial type, .69. The average intercorrelation value is .53.

Within the categories of school and classroom decisions, most intercorrelations should be negative, due to the ipsative nature of the response alternatives. Consistent with earlier consideration, various pairs of decision type categories should show stronger and more systematic relations than others. The first expectation is borne out (upper left and lower right quadrants) for both categories within which decision types fall. The second ex-

Table 4: Partial Correlation Matrix of Decision Types Across Classroom and School Affairs*

	DECISION TYPE										
CLASS AFFAIRS	Collegial	1.	1.00	.18	-.25	-.22	-.48	.69				
	Leader Determined	2.		1.00	.14	-.02	-.42		.31			
	Shared	3.			1.00	-.13	-.23			.66		
	Removed	4.				1.00	-.56				.42	
	Discretion	5.					1.00					.58
SCHOOL AFFAIRS	Collegial	6.						11.00	.22	-.49	-.48	.07
	Leader Determined	7.							1.00	-.17	-.30	-.08
	Shared	8.								1.00	-.20	-.56
	Removed	9.									1.00	-.24
	Discretion	10.										1.00

*Data from reports of 358 teachers in 41 schools. Five schools do not fit in the experimental, control or unit groups.

pectation also receives some support. For classroom decisions, collegiality is most strongly associated with discretion. Discretion is most strongly associated with removed decisions (upper left quadrant). Among school decisions, collegiality corresponds most prominently with shared and removed decisions. Discretion is most clearly associated with shared decisions (lower right quadrant).

The lower left quadrant is empty due to the generally uninteresting nature of the findings regarding across type, across category correlations. These are a mixture of small and typically negative coefficients which follow roughly the same patterns as found within category reports--upper left and lower right quadrants.

Principal Reports. To this point, control structure data reported in the first wave by principals have been kept separate from the teacher data. Conceivably, reports by the two types of informants should correspond to a high degree. However, there is also good reason to expect deviations to occur. Principals are situated differently in the organization hierarchy than are teachers. By virtue of their position they often come closer than teachers to observing and participating in decisions of a school-wide and district-wide nature. Also, because their role might be seen, in part, as enforcing regulations derived outside of the school and reporting continuously on compliance, their knowledge of decision makers external to the school and district is probably keener than that of their teachers.

These differences should not affect dramatically the pattern of principal reports when contrasted with the reports of teachers. Generally, principal reports, Table 5, parallel that from teachers. Decisions of the

type removed and discretion occur with greatest frequency when aggregating over all schools and over classroom and school-wide issues. Likewise, discretion dominates classroom decisions and removed dominates school decisions. However, principals report a considerably greater proportion of decisions of the type shared--where teachers and nonteachers render decisions jointly--than do teachers.

Table 5: Control Structure over all Sample Schools

DECISION TYPE	Class and School Issues Combined Percent	Class Issues Only Percent	School Issues Only Percent
Collegial	07	06	09
Leader Determined	02	02	02
Shared	24	23	24
Removed	34	23	49
Discretion	33	45	16

Also similar to teacher reports is the frequency with which principals report instances of collegial decisions. Although the percent of collegial decisions is less here than in Table 1 the pattern of reports is roughly the same. Collegial decisions are more likely to occur, or so it seems, over school-wide than classroom issues.

It is not clear how to account for the major difference between the principal and teacher reports, the frequency of shared decisions. Not only may it stem from slight measurement differences mentioned above but it may also be related to differences in respondent perception, a possibility that will have to be investigated more fully in these and subsequent data.

The differences between and among the experimental, control and unit schools are not nearly as sharp in the principal responses as in the teacher reports. For example, principals in schools with unit organization report higher levels of collegial decisions only over class issues and then not by a large margin. Moreover, principals report lower levels of teacher discretion over school-wide and class issues than teachers. In each case the category of shared decisions is quite pronounced in its role in homogenizing the appearance of the three types of schools and in accounting for the differences between teacher and principal reports.

Differential Changes in Control Structure

Subsequent to the first collection of data two additional rounds were obtained. Wave two data were taken in the fall of 1974 after the 16 experimental schools had installed the unit structure. Wave three data were taken in the spring of 1975 approximately six months following wave two and near the end of the first year during which the experimental schools had maintained the innovation. Data were collected on the same schedule in 13 control schools which are located in the same districts as the experimentals. Two more waves of data will have been taken by the end of the 1975-76 school year.

Somewhat different modes of data analysis have been employed to summarize the reports over three waves. These new analytic techniques give per respondent reports for each school. In addition certain issues in the six teacher task areas were dropped from analysis having netted few responses. Consequently, the percent values do not correspond exactly with those reported in the previous tables. However, the pattern of findings is unchanged.

In comparing the reports of teachers only from the experimental and control schools the following expectations are borne out. Experimental schools show a sharp increase in the frequency of collegial decisions and a corresponding decrease in discretion and removed. The control schools do not change over time. These patterns are even more pronounced when considering only the teacher task areas "subjects taught" and "student groups"--issues that concern the instructional function most centrally.

For purposes of illustration and description the five basic decision types have been altered somewhat and reduced. All decisions in which only teachers are included in the input population are called, by this convention, collegial decisions. These include the standard collegial variety, plus leader determined and those shared decisions in which the outside members of the input population are also teachers. The second or non-collegial decision is comprised of the sum of removed decisions and those shared decisions where some non-teacher belongs to the input population. The third type of decision is the standard, discretion. The percent values of these three types sum to unity and permit the display in Figure 6.

Figure 6 summarizes diagramatically the findings coming from the longitudinal application of the control structure interview. Experimental schools move in the direction of increased collegiality and simultaneously away from non-collegial and discretion decisions. Over time, control schools maintain a pattern of high frequencies of non-collegial and discretion and low amounts of collegial decisions.

Interestingly, the shift to a more collegial control structure in the experimental schools was dramatic. Using time one collegiality as the

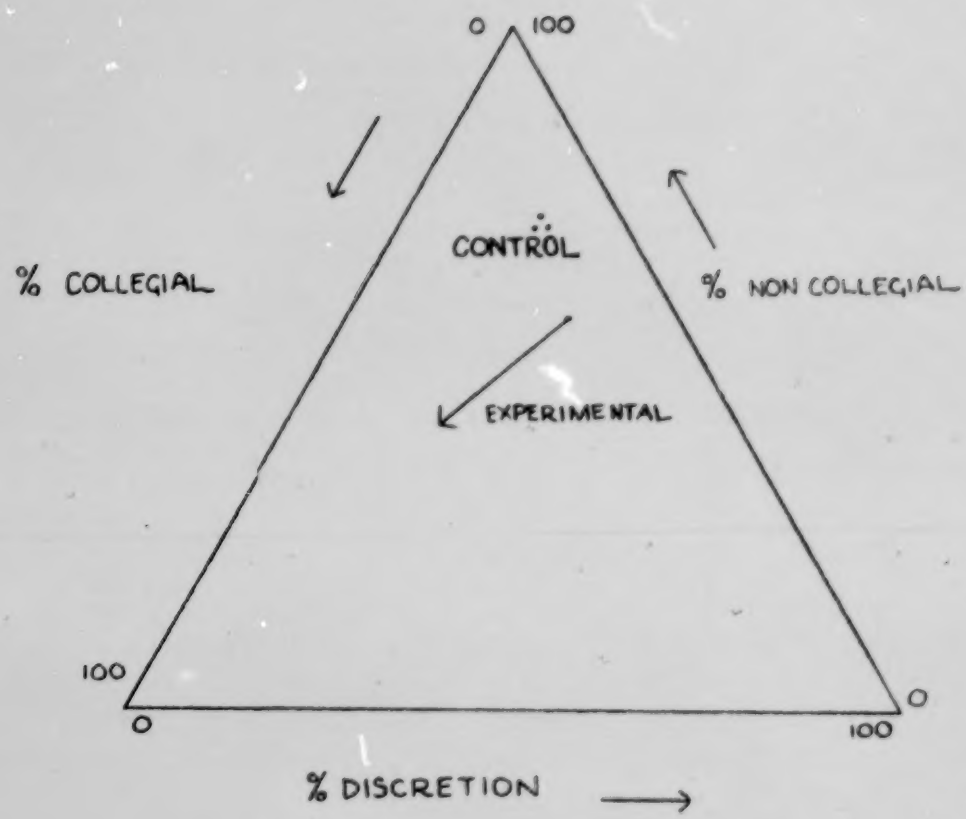

Figure 6: Change in Control Structure
Through Time, Experimental
vs. Control Schools

covariate, differences between experimental and control schools were significant at time two. However, with time two collegiality as the covariate, school type did not explain more than a trivial amount of the variance at time three. The mean difference between experimental and control schools at times two and three are significant. At each data collection the collegiality percentages over all task areas were: experimental 15.9, 23.5 and 23.2; control 11.7, 10.4 and 10.8. Over the task areas "subject taught" and "student groups" the corresponding values were: experimental, 23.2, 31.2 and 35.0; control 12.6, 9.7 and 10.3.

Remarks

The instrument we have created seems to net valid and reliable data and should considerably illuminate studies of organizational decision making in the school. In our own work on the organizational implications of a particular structural change in the conventional elementary school, the measure has been among the most sensitive and revealing of the great variety which we employ. Furthermore, the analytic and descriptive modes that we have developed seem to be useful improvements over more conventional approaches that often seem imbued with hortative overtones.

Nevertheless, the procedure has certain drawbacks which may prove prohibitive under normal conditions of research. The procedures are expensive to employ. They require sizable training and supervision costs as well as substantial contact with respondents. Furthermore, the measure produces substantial data which can become nearly overwhelming when multiple sites and time series designs are involved.

These problems notwithstanding, there presently exists no clear alternative when objective and fine grained data are required. Our preliminary analyses that also include a number of subjective measures of organizational decision making do not differentiate among experimental, control and unit schools. Correspondingly, these subjective measures appear to be unrelated to the control structure findings.

APPENDIX C

Sense of Teacher Work Autonomy: Measurement and Findings

Alienation from work and kindred concepts have been nexus of concern in social theory at least since the days of Kar Marx and the subject of empirical investigation for over two decades in industrial and occupational sociology. Blauner (1964), in particular, has probed the various modes of worker alienation in modern industrial settings, including significantly the worker's lack of control over the immediate work processes in which he or she is engaged.

As the organizational setting of teaching has come under closer scrutiny in recent years, the work autonomy, or freedom from external control, of the classroom teacher similarly has been taken as a problemmatic issue. Public-school teaching, unlike other lines of work, has been regarded by some analysts as providing a high degree of day-to-day autonomy to practitioners of the craft, of attracting to its ranks people who value freedom in their work, and of furnishing physical and social conditions that protect and reinforce such freedom. Other sociological observers of the educational scene see teachers as essentially powerless pawns who pursue their daily activities closely constrained by bureaucratic rules and guidelines in whose establishment they have no effective voice. The tension between the autonomy of classroom teachers and the organizational constraints within which they work has been explored in depth by Dan Lortie (1964, 1969, 1975) for over a decade.

Influenced by Lortie's writings, Meyer and Cohen (1971) included an index of teacher autonomy in their study of the open-space elementary school, apparently in the expectation that the

individual autonomy of classroom teachers would give way as groups of teacher--teaching teams--came to exercise control over the instructional process. [1] As reasonable as their expectations might seem, Meyer and Cohen found that teachers in the open-space, team-teaching schools reported substantially greater autonomy that those in the self-contained classroom schools they used for comparison. This was true despite the fact that the open-space teachers also reported greater influcence over their instructional practices from fellow teachers (individually or in groups). The paradoxical finding led the investigators to re-examine their concept of teacher autonomy and to probe further into their data, but the paradox was not fully resolved.

How can the autonomy of an individual *not* be reduced when matters of work over which he or she once had substantial discretion become objects of team decision? As we phrase this question, it becomes apparent that a conceptual-definitional issue is at stake. The answer depends on whether we take "autonomy" to refer to the *objective fact* of the teacher's power--as a synonym for discretion--or whether we use "autonomy" to reference a subjective, *phenomenological response* of the individual to the situation in which one finds him or herself.

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1. They asked teachers to report, on a five-point scale, the amount of influence "you have over your own (a) administration of school rules and regulations, (b) student grading practices, (c) curriculum planning, (d) teaching specific lessons or classes, and (e) student control and discipline practices." Autonomy scores were obtained by summing weighted responses over the five areas of instructional practice.

If the former, autonomy will be lost as discretion is lost by definition. On the other hand, if autonomy means a subjective feeling about the situation, it is possible (although not expected) that autonomy will increase when the group of which the individual is a part makes decisions that once were soley his or hers.

Much of the empirical literature on alienation, power and powerlessness, organizational control structure, and the like equivocates on this conceptual issue. Meyer and Cohen, too, were not entirely consistent as to whether they regarded their index of autonomy (and other "influence" measures they used) to refer to the objective facts of the teacher's work situation or whether they took the term in its phenomenological meaning--equivalent to perception of one's own influence. The questions they asked teachers were ambiguous on the point, and the investigators' language sometimes favored the former meaning and sometimes the latter.

One important feature of the MITT Project's longitudinal study of elementary schools has been to maintain a clear separation, conceptually and operationally, between the objective and subjective levels of the variables. Appendix B reports in detail the manner of assembling objective evidence regarding the locus of instructional decisions within the school's "control structure", the objective counterpart to sense of autonomy (and sense of collegial power). The present appendix describes the development of a 24-item questionnaire scale assessing the sense of work autonomy among classroom teachers. We report here our conceptualization of the

domain and the procedures used in scale development. Data regarding scale reliabliity and score distributions for a population of teachers are available for presentation, as well as the results of factor analyses undertaken to examine the dimensionality of the scale. We begin with a description of the final scale.

A. The Sense of Autonomy Scale

The 24 items of the final scale are shown in Table 1, along with the instructions for responding teachers. While developed specifically for grade-level teachers in elementary schools, item wording does not preclude its use with secondary teachers. The items do assume, however, the staff member teaches regular classes in the school, and, in that sense, the scale is not applicable to specialists with irregular teaching duties or none at all. For inclusion in a questionnaire, the items should be re-arranged from their order in Table 1 so that those with similar content do not appear together.

Teachers respond to each item according to a Likert format. The response alternative used in the MITT questionnaire are:

Strongly agree
Agree
Moderately agree
Moderately disagree
Disagree
Strongly disagree

Alternatives are weighted from 6 (for "strongly agree") to 1 (for "strongly disagree"), except for the 14 items, marked with an asterisk, whose wording is reversed in substantive meaning. For those 14 items, the weights run from 1 to 6. In scoring a teacher's questionnaire return, weights of the chosen alternatives are summed over the 24

Table 1
Items for the Sense of Autonomy Scale

FEELINGS TOWARD WORK

For the following items please indicate the extent to which each describes your feelings about your work in this school.

1. On the whole, my students and I can establish the rhythm of daily activities rather than have it determined for us by people or events outside the classroom.

2. Generally speaking, I believe I can pretty well decide my own pace of work as a teacher.

*3. Much of the time I feel pressed by the daily schedule.

4. In my present job I feel relatively free to decide how fast to cover instructional material with my students.

*5. Curriculum guides exert an uncomfortable influence on what I teach.

*6. I sense pressure from the administration concerning how I spend my time during the day.

*7. In this school a teacher has to look busy when he is on duty, even when there is nothing urgent to do.

*8. I am so tied down to the classroom that I would find it hard to take a short break from the kids, even if I really needed to.

9. Aside from things which lie in myself, there is little that holds me back from doing a good job of teaching.

*10. I simply cannot find the time I need in this school to do the kind of teaching I know I am able to do.

11. I feel as though I can pretty well decide what youngsters I will work with in my classroom.

*12. I rarely have a chance to use the teaching methods I think work best for me.

13. I feel free to try out new teaching ideas with my classes.

*14. Generally speaking, I feel as though the teaching techniques I can use are closely controlled in this school.

Table 1 Continued

15. School funds permitting, I believe I am perfectly free to use whatever instructional materials I think will work with my classes.

*16. This school exerts an excessive influence on the discipline measures I can use in the classroom.

*17. I would have uneasy feelings if I gave unusually high (or low) grades to my classes, even though I had sound reasons of my own for doing so.

*18. I feel I have little say over how the progress of my students is to be judged.

19. I am confident that the principal trusts my judgment when it comes to evaluating class performance of students.

*20. I feel that in this school I must abide by someone else's ideas on how I should grade my own students.

21. This is one school, at least, in which I do not feel as though someone were peering over my shoulder at the way I teach.

22. I feel free to say whatever I wish to my pupils in the classroom.

*23. I must constantly be on guard around here against doing or saying the wrong things in my teaching.

*24. A lot of the time I have the idea that other teachers want to find out what I am doing in my classroom teaching just so they can judge me.

items, then divided by 24. In principle, scale scores can range from 1.00 to 6.00, where a low value indicates low feeling of autonomy in work and a high score represents a strong sense of autonomy. Where one or two, but not more than two, items are skipped by a teacher, our practice has been to compute the respondent's scale score after dividing by the number of completed items--which, in effect, is to assign the skipped items the mean value of the completed items. No score is computed if more than two items have missing values.

B. Conceptualization

Sense of autonomy is a psychological construct representing a teacher's beliefs about his or her freedom from external interference, pressure, or control in performing the work of classroom instruction. A strong, or high, sense of autonomy means that the teacher feels generally free to guide his instructional work with students in terms of his or her own personal judgment; he or she may solicit ideas and advice from others, but he or she feels no obligation to accept suggestions without weighing their merits. A low sense of autonomy implies that the teacher feels generally constrained in his or her work activities by persons, rules and regulations, or other conditions and forces lying outside the immediate instructional setting and outside of him or herself; he or she believes there is little latitude for bringing personal judgment to bear in the performance of his or her work.

Low sense of autonomy is conceptually similar to the dimension of alienation that Seeman (1959) termed *powerlessness* ("the expectancy held by the individual that his own behavior cannot

determine the occurence of the outcomes, or reinforcements, he seeks"), except that sense of autonomy in our usage focuses specifically on the work situation rather than globally on the individual's relation to the society and world at large. In our case, the outcomes to be sought are those of "doing a good job of teaching", however the teacher may define it.

An *external* constraint on task performance is one which emanates from beyond the immediate instructional setting. Shortly, we will indicate the general character of such constraints, but here we need to point out two types of limitation on "doing a good job of teaching" that are *not* implicated in our conception of sense of autonomy. First, difficulties the teacher experiences in working with pupils is not an external constraint; it is part of the challenge of the teaching job itself and does not concern autonomy as we mean it, unless, of course, the teacher **believes** he or she is restricted in coping with the difficulties by forces outside the classroom walls.

Second, we exclude from our meaning of sense of autonomy the teacher's beliefs regarding his or her own competence or ability to perform the tasks at hand. Teachers vary markedly in the extent to which they have confidence in their capacities to do a "good job of teaching" independently of constraining forces from the outside, and we wish not to confound variations in feelings to personal efficacy, self-confidence, competence, and the like with the concept of autonomy.

The import of these exclusions is that a high sense of

autonomy is a necessary but not sufficient condition for a teacher to believe his or her own actions can determine the outcomes he or she seeks. The absence of outside interference, regulation, or pressure does not certify *ipso facto* that he or she will feel in full command of the instructional task. Discussions in the literature on power and powerlessness, internal and external locus of control, and similar polarities are not always clear on the asymetrical nature of the terms.

We regard sense of autonomy as a kind of attitude, emphasizing the affective component. Like any attitude, it is assumed to mediate, along with other dispositional properties of the individual, between objective conditions of the workplace and manifest behavior. It is not expected to stand in a one-to-one relationship either with objective conditions nor with behavioral variables. Thus, alterations in the school's control structure, objectively defined, have differential implications for feelings of autonomy, depending upon other social circumstances or psychological dispositions of the individuals affected. We anticipate, for example, that a basic personality attribute, the individual's need for autonomy, is a contingent dispositional factor, and that the presence or absence of a norm of autonomy in the workgroup of which the teacher is a member is a contingent factor of a social variety. Similarly, the linkage between sense of autonomy and behavioral consequences is contingent on other dispositions and conditions. Specifically, we postulate that sense of autonomy is one contributor to teacher job

satisfaction, depending, however, on the importance he or she attaches to autonomy in his or her range of occupational values.

In his study of alienation among manual laborers and craftsmen, Blauner (1964) offered a useful analysis of the component of the immediate work setting significant to the worker's feelings of freedom or control. He discussed such things as "freedom of movement, freedom to make choices, freedom from oppressive constraints." The constraints in which Blauner was interested were not just those posed by other people, like supervisors, but constraints arising from the nature of the work itself, including workflow conditions and the intrusion of machines. "Freedom", as Blauner saw it, "is the state which allows a person to remove himself from these dominating situations that make him simply a reacting object." Lortie's (1969,1973) various analyses of teachers and teaching added particulars to the same line of thought and pointed up components of work especially significant in the classroom setting.

We drew on these two sources for ideas concerning specific domains of teacher sense of autonomy. The first five components in the following list are Blauner's, with questions translating the components to apply to the context of teaching, while the last two were suggested by Lortie's writings.

a. Control over the *pace of work*. (Blauner regarded this as the most important component among manual workers by virtue of its effect on the level of the worker's freedom in other components.) Does the teacher feel he or she can set the pace in his or her teaching, or

does he or she feel the pace is established for him or her by the daily schedule or other conditions?

b. Freedom from the *pressure* of work. Does the teacher feel under pressure to cover material or to keep ahead of the class, or does he or she feel he or she can carry out his or her teaching duties in a relaxed manner?

c. Freedom of *physical movement*. Does the teacher feel inexorably tied down to his or her location of work, the classroom, or does he or she feel he or she can take time away from his or her teaching during the day?

d. Freedom to control the *quality* of one's work. Does the teacher feel he or she can take the time he or she needs to work with individual students; does he or she feel under constraint in preparing for his or her teaching?

e. Freedom to choose the *techniques* of work. Does the teacher feel free to try out his or her own ideas in the classroom, to choose the teaching methods he or she will use, and to use instructional materials of his or her own choice?

f. Freedom to determine the *criteria* and techniques for assessing student performance. Does the teacher feel he or she can decide how he or she will grade pupils, or does he or she feel he or she must use the results of standardized tests, grade on "the curve", or use someone else's criteria of judgment?

g. Freedom from *surveillance* by parents, supervisors, or other teachers. Does the teacher feel that other people are keeping

a close watch over the way he or she teaches, that he or she must constantly be on guard in what he or she says or does in the classroom, or that he or she is being supervised too closely by the principal or others?

These components represent an extensional definition of the sense of autonomy construct used in the study.

C. Scale Development

Using our conceptualization as a guide, MITT staff members wrote a large number of questionnaire items intended to tap sense of autonomy; after compiling, discussing, and editing, the number reduced to twenty-six.[2] Since we planned to develop a summative scale, items were written to sample the components listed above. We did not attempt to sample any given component heavily enough to allow us to measure it as a separate dimension; in any event, we were not certain, at the item-writing stage, that the components were entirely applicable to the work of teaching. The items listed in Table 1, incidentally, are arranged in order of the components, *a* through *h*, of the preceding section. The two additional items subsequently dropped from the scale follow:

25. I doubt that I would have trouble getting a few days off from school once in a while to attend to personal business.

26. This is a community where a teacher must be especially careful not to discuss topics in his classes which are controversial. (Reversed scoring.)

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2. Two graduate research assistants were especially helpful in this phase of the work: John DeFlaminis and Suzanne Gaughen.

The item-writing sessions brought into focus several issues that subsequently sharpened our conceptualization of sense of autonomy. It may be useful to review them here.

a. We had to take care that the source of control over teaching activities reflected in the items lay outside the classroom and excluded the teacher's students. We assumed that teachers (or many of them) regard it as fitting and proper for their instructional plans to be constrained by student interests, capacities, or demands and that such feelings of constraint from within the classroom are not indicative of sense of autonomy as we defined it.

b. We sometimes found it hard to write items restricted to teaching activities rather than to more general aspects of the teacher's work in the school, like constraints on arrival and departure times or constraints on personal liberties away from school.

c. Similarly, we encountered some difficulty in writing items that did not simply mirror objective conditions of work--*i.e.*, items that merely asked teachers to report features of their work situation. If responses would automatically vary under different or changed conditions of the school, the item was rejected.

d. Special pains were required to avoid items that touched on teacher feelings of competence. We found that we could detect such items by asking ourselves whether increased experience in teaching would or would not, by itself,

lead to more positive responses.

In the end, 26 items deemed potential candidates for the sense of autonomy scale were prepared and placed in a questionnaire for field testing.

D. Item and Scale Performance

A field trial of the various scales intended for inclusion in the teacher questionnaire of the MITT study was conducted in the fall and winter of 1973-74. (Appendix D gives further details of the field test.) With regard to the sense of autonomy scale, the Project staff addressed three basic tasks: (1) the identification and deletion of defective items from the scale, (2) determination of the scale's reliability, and (3) certification that the sense of autonomy measure would be reasonably independent of the other phenomenological variables key to the MITT study.

The field test was carried out in nine public elementary schools of Oregon and California selected to reflect the range of characteristics of schools likely to be chosen for the main study. An effort was made, for example, to obtain several schools with open-space architecture and reputed to be team teaching, as well as schools of a more conventional mode. Questionnaires were administered by MITT staff members at the end of November 1973 in Oregon schools and in the middle of January in California yielding 170 useable responses. Teachers in two of the Oregon schools were readministered an identical form of the questionnaire in late April 1974--

nearly five months after the first administration. Although the number of teachers responding twice was small--24 for this scale--the retest provided grounds for estimating the stability of the measure.

1. Defective items. Two approaches were taken to identify items that were obviously defective or that did not contribute to the scale. First, the response distribution of each item over the six alternatives was inspected for instances in which little or no variation was displayed. Table 2 shows the distributions obtained in the first wave of data collection of the main study. (We show these rather than results of the field trial, since the two sets are closely parallel, and the former is the more relevant for subsequent analysis.)

Responses tended to fall on the "high" sense of autonomy side of the distribution for most of the items. That is, respondents tended to agree with the positively worded items and to disagree with the negative items, but in no instance did a large majority of responses congregate in one category. There were six items in which over one-half of the responding teachers chose a single alternative, but the number did not exceed 55 percent. Several items had rather high non-response rates, as indicated in the left column of the table. This is especially true for Item 11, which asks teachers whether or not they feel they can "decide what youngsters I will work with in my classroom." This item could be ambiguous for teachers in self-contained classrooms where there is no choice as to who is in the class but where the teacher can decide on how to distribute his time among those that are there. Despite the item's possible ambiguity, we were

TABLE 2: Percentage Distributions of Responses to Twenty-six Sense of Autonomy Items, MITT Teachers, Spring 1974. N = 619.

Item**	Alternative*** 6	5	4	3	2	1	Non-Responses (Number)
1	43	34	16	2	4	1	4
2	51	34	10	3	2	*	-
3 R	8	26	17	25	14	10	1
4	46	39	11	3	1	*	-
5 R	15	47	22	10	4	2	22
6 R	22	47	12	12	5	2	8
7 R	25	43	15	11	4	2	11
8 R	16	31	14	15	12	12	8
9	29	42	13	9	5	2	11
10 R	14	40	18	15	6	7	15
11	12	21	17	11	28	11	46
12 R	23	54	15	5	2	1	9
13	45	46	7	1	1	*	1
14 R	22	52	13	7	5	1	7
15	38	42	12	3	4	1	3
16 R	10	42	17	15	11	5	10
17 R	20	49	16	8	5	2	15
18 R	19	54	16	7	3	1	7
19	38	45	13	2	1	1	5
20 R	24	48	13	9	4	2	7
21	33	42	14	6	3	2	5
22	18	43	23	10	5	1	8
23 R	18	52	18	8	3	1	6
24 R	31	50	11	5	1	2	9
25	13	31	11	9	21	15	7
26 R	9	41	24	16	7	3	18

*Less than 1 percent.

**See Table 1 for wording of first 24 items and text of the appendix for Items 25 and 26.

***A column heading of 6 corresponds to the "Strongly Agree" alternative, except for items with reversed scoring, marked R by the item number, in which case 6 corresponds to the "Strongly Disagree" alternative.

reluctant to drop it from the scale at this point because it is especially pertinent to the changes in instructional organization anticipated in schools of the MITT study. With that exception, our inspection revealed no items that were clearly defective from the standpoint of their response distributions.

Our second approach to item deletion was to examine the matrix of item intercorrelations from the field trial data in an effort to detect those correlating poorly with others in the scale. While most of the items had uniformly positive and substantial correlations (taking account of reversed content), two in particular had essentially zero coefficients with the others in the matrix, sometimes falling on the negative side of zero. These were Items 25 and 26. The algebraic means of their coefficients were +.002 and +.085 respectively. These values can be compared with the means of the remaining 24 items in the scale of +.270.

Reconsideration of Item 25, asking teachers about the difficulty of "taking a few days off from school to attend to personal business", brought the realization that it was probably a faithful reflection of differences in an objective condition of the school, *viz.*, whether or not such leaves were covered by the teachers' employment contract or a school policy. Item 26, asking teachers about community concerns regarding the discussion of controversial topics in the classroom, was the sole item specifically focusing on constraints from the nonschool source. We recognized that responses to this item

would probably vary with the provincialism of the community in which a school happened to be located and would be relatively insensitive to the through-time changes within the school that the MITT study was intending to investigate. Both items, then, seemed to be potential candidates for deletion from the scale. Item 11, called to our attention by the large number of nonresponses, had somewhat higher correlations than Items 25 and 26, although lower than the rest. Its mean was +.161 (with Items 25 and 26 removed), compared with a mean of +.270 for the remaining 23 items.

Pursuant on the computation of the intercorrelation matrix, a factor analysis was performed and the first principal component of the unrotated factor matrix was inspected for unusually low loadings. Most items had loadings on the first component in excess of .35 (up to .75) but Items 25 and 26 had loadings closer to zero: .06 and .24, respectively. (Item 11 loaded slightly higher, .29.) This information plus the substantive considerations noted above confirmed our decision to drop Items 25 and 26 from the sense of autonomy scale. A subsequent rotation of the 26-item factor matrix further supported this decision: the items each loaded on a weak and uninterpretable factor in the rotated matrix. The same can be said for Item 11, but the pivotal nature of the item content led us to retain it for scoring purposes. A consideration to be brought up in Section F questions its retention.

Our discussion of the sense of autonomy measure from here on, and throughout the report, relates to the scale with Items 25 and 26 deleted.

2. Reliability estimates. An initial estimate of reliability of the sense of autonomy scale was obtained from responses to the instrument administered during the winter of 1973-74. With specialists and other nonclassroom teachers excluded. There were 126 teachers who gave responses to all 24 items. The reliability estimate was based on computations of the variance of total scale scores (not the mean scores) and the variance of scores for each item, and from these the ratio of universe score variance to expected observed-score variance--the reliability coefficient--was calculated (Stanley, 1971). This is essentially an estimate of internal consistency of the scale. In the present application its value was .901.

A more revealing approach to the evaluation of reliability, or "generalizability", was obtained from a readministration of the trial questionnaire nearly five months later in two of the field-test schools, following procedures developed by Cronbach, *et al.*, (1972), in which both item and occasion (test-retest) contributions to error variance are taken into account. The approach yields estimates of the separate variance components from analysis of variance computations, in our case a three-way analysis of variance of p x i x j, where *p* refers to person, *i* to items (n_i = 24) and *j* to occasions (n_j = 2). For this analysis, the number of classroom teachers in the subsample was n_p = 24.

Using the randomized model for estimation, the first column of numbers in Table 3 gives the estimate of each variant component--for person (teacher), item, occasion, their three interactions, and the residual. Variance components are divided by the numbers in the second column to obtain expected observed-score variances, the third column.

TABLE 3: Estimated Variance Components for Sub-Sample of Field-Trial Teachers and Estimated Reliability and Measurement Error Applicable to MITT Study Design.

Source of Variance	Estimate of Variance Component*	Sampling Frequency	Expected Variance	Error of Measurement
p (person)	.1899	1	.1899	
i (item)	.4372	24	.0182	
j (occasion)	0	1	0	
pi	.3924	24	.0163	.0163
pj	.0246	1	.0246	.0246
ij	.0157	24	.0007	
pij,e	.4609	24	.0192	.0192
				$\hat{\sigma}^2(\delta) = .0601$

MITT Study Design: p x i x j, $n_i = 24$, $n_j = 1$.

$\sigma^2(u_p)$ (universe score variance) = .1899

$\hat{\sigma}^2(\delta)$ (error of measurement) = .0601

$E\sigma^2(X_{pI})$ (expected observed-score variance) = .2500

E_p^2 (reliability) = $\dfrac{\sigma^2(u_p)}{E\sigma^2(X_{pI})}$ = .76

*From crossed design, p x i x j; $n_p = 24$, $n_i = 24$, $n_j = 2$.

The latter values are relevant to the data-taking design of the MITT study proper, where we intend to estimate the teacher's universe score (relative to that of all teachers) from just one administration of the 24-item scale in each semi-annual wave of data collection. The reliability (generalizability) coefficient and estimates of error variance for the intended design are reported at the bottom of the table.

The reliability is shown as .76, lower of course than the .901 value for the total sample that reflects only the scale's internal consistency. Examination of the expected variance components shows, indeed, a large contribution to error of the person-by-occasion component, $\hat{\alpha}^2(pj) = .0246$. The other two contributors-- the person-by-item component and the residual--are small by comparison. (The square root of these values scales them to the actual score range, 1.00 to 6.00.) Apparently, responding teachers tended to shift their relative positions from one administration of the measure to the next, producing an element of through-time inconsistency. Our intended design samples this source of error only once in a given wave of data collection, providing no opportunity for bringing it under better control. In principle, we could do better to improve reliability by administering the scale twice to teachers than by doubling the number of items.

This line of thinking led us to consider the "enduringness" of the attribute we were seeking to measure, particularly in light of the time interval implicated in the two test administrations, late November to mid-April, and unknown conditions in the field-trial sites.

Conceivably, changes could have occurred in teacher "true scores" during the delay of nearly five months, and some of what we are calling error variance could rather be regarded as systematic, or "wanted", variance. Unfortunately, we know little about the two schools in the sub-sample, specifically whether or not events had occurred during the interval that might be expected to alter teacher sense of autonomy. Presumably this attribute is not immutable among teachers, for if we thought it were the hypotheses of the MITT study it would be nonsensical.

We are dealing, in Thorndike's (1951) terms, with a "temporary but general" attribute of teachers rather than a "lasting but general" attribute, but the difficult question is, how temporary is temporary? Is the "enduringness" of the sense of autonomy attribute in which the MITT study is interested a matter of only a day or a week (certainly not), a matter of a month or two or an academic semester (possibly), a year (perhaps), or several years (no)? If the universe of admissible occasions is a year, that is, if we are willing to accept a measure taken on any day of the school year as interchangeable with one taken on any other day in that time span, then the variance component we obtained for the test-retest interval is to be regarded as error variance, and we would, in fact, sample it twice in the MITT study. In that case, the reliability estimate of the combined measures would increase to .88. (Not only would the occasion component be sampled twice, but the residual component would be sampled twice as often also.)

However, certain hypotheses of the MITT study depend on our ability to identify changes in teacher sense of autonomy associated

with short-run alterations in particular aspects of school organization. For example, there would be evidentiary value in observing an increase in sense of autonomy immediately following the formal establishment of a unitized staff organization at the first of the school year but prior to the emergence of task interdependence among teachers later on in the year. The very purpose of the twice-yearly schedule of data-collection was to allow us to detect such short-run changes. This framework implies that we take "temporary" to mean an interval of about a school term and that the universe of admissible occasions would be any testing day between, say, October through November for the first term and between February through April in the second. Our field-trial data are irrelevant to the estimation of the occasion component of error in this narrower frame of reference, since there were no repeated measures within a term.

The "enduringness" issue is tied to a corollary set of questions: what conditions and processes affect the teacher's level of sense of autonomy and how stable are *they*? As just noted, the MITT Project incorporates assumptions about school conditions which, if stable over a period of time, will yield stable autonomy scores, and the assumptions will be subject to empirical test in the course of the main study. Thus, we should be in a better position to address the "enduringness" issue and the appropriate time interval within which to estimate occasion error at the end of the study than at the beginning.

Meanwhile, we have an estimate of internal consistency

reliability derived from the field-test sample of 126 teachers whose value is .90. A somewhat smaller coefficient (.87) was obtained from the 24-teacher subsample at the first test administration, but that could be the result of the slightly restricted range of mean scores in the subsample, a standard deviation of .51 (around a mean of 4.74) compared with a standard deviation of .66 (around a mean of 4.65) in the full sample. The larger coefficient is the better estimate.

3. Independence from other phenomenological variables. Teacher sense of autonomy in work is one of several phenomenological variables hypothesized in the MITT Project to be related to one another in specified ways. It is of considerable significance to certify that our measure of sense of autonomy is reasonably independent of measures of the other teacher attributes, especially since all are to be assessed through responses to questionnaires. We did not want the sense of autonomy items inadvertently to be alternative ways of measuring one or more of the other variables.

Factor analyses of items in all of the principal subjective scales was our method of determining the extent of independence. We followed both orthogonal and oblique rotational solutions, the latter on the grounds that the variables, while conceptually distinct, would not necessarily be uncorrelated with one another. Appendix D describes the results of the analyses in detail, and the reader is referred to that source.

Here it is sufficient to report that the more definitive of the factor analyses, based on the first wave of data from the main

study, demonstrated substantial independence of the sense of autonomy scale. Items from five scales were included in the analysis besides sense of autonomy--Meyer and Cohen's measure of job-career satisfaction (5 items), the Pellegrin measure of work satisfaction (10 items), two scales indicative of sense of collegial power in school-wide affairs (5 items each), and a measure of professional ambition of teachers (4 items), the latter three also attributable to Meyer and Cohen. Counting the 24 sense of autonomy items, a total of 53 items were included in the factor analysis. Fourteen factors with eigenvalues exceeding 1.00 were extracted and rotated orthogonally for this analysis, and 12 of these factors were nontrivial and interpretable.

The sense of autonomy items were distributed over six of the 12 factors. By and large, these factors represented recognizable dimensions within the sense of autonomy scale, as we describe in the Section F of the appendix. Only two items from scales other than sense of autonomy had loadings of .30 or greater on any of these six factors, and the loadings were comparatively low (.31 and .37). The remaining six nontrivial factors clearly reflected the other scales in the factor analysis and, conversely, only three sense of autonomy items had loadings greater than .30 on any of them; again, their loadings had low values of .30 and .36. In short, the sense of autonomy scale was found to be substantially independent of the other phenomenological variables measured in the same questionnaire.

E. Sense of Autonomy Scores in the MITT Project Schools

In this section we report the general distribution characteristics and selected breakdowns of scores from the sense of autonomy scale. The data are for 600 classroom teachers in the 40 elementary schools of the MITT study who completed questionnaires administered in the first round of data collection in late April and early May of 1974. Scores from the 24-item scale were computed according to the procedures described in Section A of this appendix.

Table 4 shows the distribution of scores, grouped in intervals of .5, for all of the classroom teachers. Of the 619 teachers, 22 failed to respond to three or more of the items and scores were not computed for them. The mean score was 4.67 for the population, with a standard deviation of .578 (computed from ungrouped data). In principle, the scores can range from a low of 1.00 to 6.00, the highest sense of autonomy value, but the lowest score found among the teachers was 2.25. Two teachers had scores of 6.00. The frequency distribution has a pronounced negative skew, as the histogram of the scores indicates. (See Fig. 1.)

The few male teachers in the population (8 per cent) had slightly lower mean scores than females.

	Mean	Standard Deviation	Number
Male	4.60	.602	46
Female	4.67	.572	550

With respect to teacher age, Table 5 reporting mean scores by age group indicates that teacher sense of autonomy increases regularly from one age category to the next higher, accompanied, as the reader can

TABLE 4: Frequency Distribution of Grouped Sense of Autonomy Scores, MITT Teachers Spring 1974. N = 619

Score Interval	Number	Percent
2.0 - 2.5	1	.2
2.6 - 3.0	3	.5
3.1 - 3.5	18	3.0
3.6 - 4.0	67	11.2
4.1 - 4.5	149	25.0
4.6 - 5.0	207	34.7
5.1 - 5.5	128	21.4
5.6 - 6.0	24	4.0
Total	597	100.0%
No Score	22	

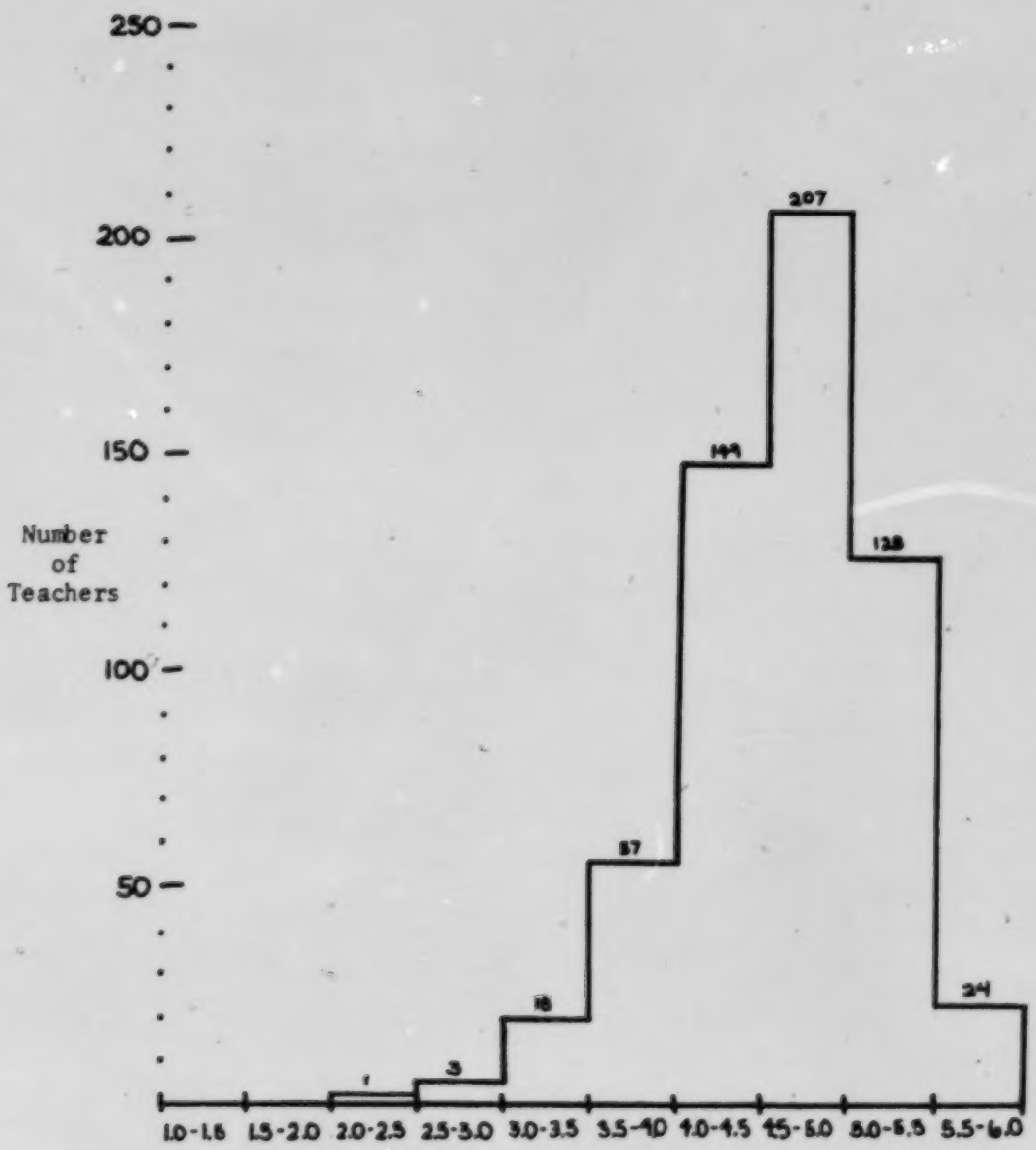

Fig. 1: Histogram of Sense of Autonomy Scores

MITT Teachers, Spring 1974

TABLE 5: Sense of Autonomy, by Age Group, MITT Teachers, Spring 1974.

Age Group	Mean	S.D.	Number
20 - 29 Years	4.59	.594	276
30 - 39	4.67	.588	132
40 - 49	4.74	.522	84
50 - 59	4.82	.531	68
60 years and over	4.93	.496	23
Total			583

observe from the standard deviations, by a decrease in score dispersions. The youngest category of teachers containing nearly half of the population has scores widely dispersed around the mean of 4.59, while teachers in the 60-69 age bracket had somewhat more uniform scores around their mean of 4.93.

In Table 6 we have assembled the sense of autonomy score breakdowns by total years of teaching experience and years of tenure in the school, categorized in finer groupings for the earlier years than for the later years. Both data sets have a form similar to the age breakdown--lower sense of autonomy scores (and larger dispersions) among teachers with less experience or tenure, and higher scores (with smaller dispersions) among those with longer experience or tenure. While the relationships do not appear to be as regular as in the case of age, this is partly a result of the way the data are grouped in the table. Recategorization in 10 year intervals of experience and tenure reveals the progression of scores to be more consistent for both breakdowns, although the progressions still are not as regular as that for age. All three variables, of course, are highly correlated, and it is impossible to discern their independent contributions from these tabulations.

With one prominent exception, grade-level assignment of teachers (K-6) was not associated with sense of autonomy. The 43 kindergarten teachers in the study (7 percent) had substantially higher scores than grade-level instructors.

TABLE 6: Sense of Autonomy Scores by Years of Teaching Experience and Years in Present Position (Tenure) MITT Teachers, Spring 1974. N = 619

Years	Teaching Experience Mean	S.D.	Number	Tenure in School Mean	S.D.	Number
1 Year	4.64	.619	57	4.66	.607	154
2 - 3	4.61	.592	128	4.60	.612	193
4 - 5	4.55	.604	89	4.69	.470	81
6 - 7	4.62	.526	57	4.76	.680	42
8 - 9	4.80	.596	38	4.80	.515	29
10 - 14	4.75	.578	65	4.73	.476	41
15 - 19	4.67	.465	55	4.57	.586	18
20 - 29	4.65	.597	51	4.99	.307	19
30 or more	4.98	.453	48	4.89	.323	8
Total			588			585

	Mean	S.D.	Number
Kindergarten	4.86	.563	43
Grades 1 to 6	4.66	.574	533

Means for teachers at the other grade levels varied only slightly around the mean of 4.66. (Excluded from these calculations were 21 seventh- and eighth- grade teachers who represented a unique group.)

In sum, sense of autonomy scores, with a mean in the population of 4.67, were slightly higher for females than males, considerably higher for kindergarten teachers than for teachers of grades one through six, and increased with teacher age, years of teaching experience, and years of tenure in the school.

F. Dimensions of the scale

Several factor analyses implicating items of the sense of autonomy measure were run at various times in the course of the scale's development, partly in an effort to discern its underlying dimensionality. Some analyses incorporated items from a number of MITT scales, but two were run on the autonomy items separately: one on the 26 items for teachers in the field test and one on the 24-item scale for a 50 percent sample of teachers from the first wave of the main study. The dimensionality of the scale was fairly consistent across all of these analyses. Here we present results of the analysis based on responses of teachersin the main study, N = 289, which is representative of findings from the others.

For these data, seven of the extracted factors whose

eigenvalues exceeded 1.00 were rotated to an oblique solution.[3] We have reproduced the unrotated factor matrix in Table 7 and have rearranged items and otherwise simplified the display of the rotated matrix in Table 8. The last table, 9, gives the matrix of factor correlations. The reader should refer to Table 1 in Section A of this appendix for the exact wording of items.

Although not necessarily intended or expected, the factors obtained from the analyses corresponded roughly to components of the autonomy domain suggested by Blauner and Lortie and that guided our item preparation. We had not written items to tap each component exclusively and, indeed, few items loaded on only one of the factors to the exclusion of others, even with oblique rotation, but there seemed to be a general correspondence between the components and the resulting factors. We will discuss the factors roughly in the order of their appearance in the factor analysis.

Freedom to determine student assessment criteria. Items related in any way to feelings of external constraint over student assessment or grading standards consistently appeared as a separate factor in our various analyses.

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3. We used the FACTOR subprogram from Statistical Packages for the Social Sciences for the computations. Initial factor extraction was done by the principal factor method with iterated communalities (PA2) and, for oblique rotation, the delta parameter was set at zero.

TABLE 7: Unrotated Factor Matrix and Estimated Communalities for 24-Item Sense of Autonomy Scale, MITT Teachers, Spring 1974.*

Item Number	I	II	III	IV	V	VI	VII	Communality
1	.56131	-.58054	-.24259	-.00530	.25724	.10742	-.02290	.78921
2	.62364	-.46282	-.08094	-.14690	.16328	-.07496	-.08930	.67151
3	-.38222	-.01040	.36288	.04289	.28670	.00045	-.09822	.37157
4	.62158	-.34977	.00521	.00290	-.05260	-.22695	-.05160	.56568
5	-.30301	-.11926	.01173	.08344	.15102	.35852	-.15070	.28718
6	-.51349	-.23408	.18945	.37757	-.05044	.14598	-.05046	.52332
7	-.52094	-.38614	-.05490	.22800	-.23435	-.16278	.02231	.55740
8	-.32806	-.20675	.41120	.22518	-.04283	-.16476	.11157	.41159
9	.40853	-.03162	-.22374	.11602	-.08876	.13469	.14335	.27799
10	-.37726	-.12541	.27036	-.20235	.03587	-.22257	.01791	.32324
11	.21750	-.31220	-.12283	.10547	-.05703	-.02500	.21794	.22236
12	-.46663	-.23584	.35223	-.33443	.08865	-.04695	-.06557	.52364
13	.60264	.17286	.03289	.32270	.11268	-.15388	-.05879	.53810
14	-.45740	-.36065	.04203	-.18880	-.14365	.22044	.30849	.54109
15	.41326	-.01797	.13724	.19195	.13025	-.13209	.01810	.26153
16	-.42885	-.00458	.14989	.11330	.08321	.16556	.09450	.26250
17	-.46940	.00394	-.26289	-.03693	.17395	-.08284	-.03194	.32897
18	-.63415	.06688	-.32339	.03485	.26398	-.13026	.25938	.66635
19	.60995	-.05848	.25645	.16362	.02912	.17390	-.01405	.49929
20	-.43203	-.00102	-.08707	.15428	.30045	-.09368	.17808	.34879
21	.48292	.17105	.19186	-.07011	.28289	.09437	.18863	.42871
22	.56880	-.07299	.19097	-.05934	.00483	.03355	.09240	.37854
23	-.68997	-.05873	-.21406	.06405	.04335	-.01930	-.15534	.55588
24	-.33038	-.18240	-.14891	.02867	.05069	.02992	-.31377	.26733
Per Cent of Variance	54.7	12.7	10.4	6.7	5.8	5.0	4.8	

*Correlation matrix based on 50 per cent sample, N = 289.

TABLE 8: Factor Structure of 24-Item Sense of Autonomy Structure, Obliquely Rotated, MITT Teachers, Spring 1974.*

Item Number	Factor** I	II	III	IV	V	VI	VII
Student assessment criteria							
19	.57				.49		
22	.50				.47		
17	-.53						
20	-.57						
23	-.60				-.60		
Pace of work							
1		.86					
2	.44	.79					
4	.50	.66				.40	
Time pressure							
9			.49				
3			-.50				
10			-.54				
12			-.69				
Uninterpreted							
8				-.56			
6				-.48		-.47	
Surveillance							
21					.64		
24					-.44		
7				-.40	-.60		-.40
Uninterpreted							
5						-.52	
Techniques of work							
14							-.71
13			.42		.41		.61

*Only factor loadings of .40 or greater are entered in the table.

**Factors have been reflected so that positive loadings indicate high sense of autonomy.

TABLE 9: Correlations of Seven Factors Obliquely Rotated, MITT Teachers, Spring 1974

	Correlations*					
	II	III	IV	V	VI	VII
I	.39	.30	.08	.41	.30	.31
II		.33	-.01	.20	.22	.13
III			.14	.24	.26	.21
IV				-.01	.07	.11
V					.22	.33
VI						.13

*Factors have been reflected so that positive values indicate high sense of autonomy.

Factor 1 of the data in Table 8 is a case in point. The bellweather item of this factor, loading - .81, is:

> 18. I feel I have little to say over how the progress of my students is to be judged.

Three others of the same type had substantial loadings on the factor; they concerned "uneasy feelings about giving unusually high (or low) grades to classes" (Item 17), the feeling that "I must abide by someone else's ideas about grading" (Item 20), and the belief that "the principal trusts my judgment when it comes to student evaluation (Item 19).

Control over the pace of work. Blauner believed that the worker's ability to establish the timing of acts and the rhythm of work during the day is a central component of autonomy. "The pace of work", he wrote, "is probably the most insistent, the most basic, aspect of a job and retaining control in this area is a kind of affirmation of human dignity" (Blauner, 1964, p. 21). While he had in mind constraints imposed by machinery and the workflow primarily, teachers, too, varied along a dimension of the pace of work. Factor II has three items defining it:

> 1. On the whole, my students and I can establish the rhythm of daily activities rather than have it determined for us by people of events outside the classroom.
>
> 2. Generally speaking, I can pretty well decide my own pace of work as a teacher.
>
> 4. In my present job I feel relatively free to decide how fast to cover instructional material with my students.

The items point to the importance elementary teachers attach to being able to work out a flexible teaching routine with their pupils,

modifiable at the teacher's discretion and free of constant interruptions and arbitrary time boundaries. Smith and Geoffrey (1968) emphasized the significance to teachers of establishing the classroom "activity structure" of the classroom and Reynolds (1972) found that elementary teachers were especially unsettled by an innovative school program seriously fragmenting the teacher's day and week and making it nearly impossible to develop a classroom routine for the students.

Freedom from work pressures. Closely associated with pacing is the feeling of being able to regulate the pressures of work that characteristically impinge on the individual in some work environments. Time to do what needs to be done with students is the pervasive enemy of the teacher, and items alluding to the press of time consistently grouped together to define such a factor in our various analyses. In the present instance they appeared as Factor III, including:

3. Much of the time I feel pressed by the daily schedule.

9. Aside from things which lie in myself, there is little that holds me back from doing a good job of teaching.

10. I simply cannot find the time I need in this school to do the kind of job of teaching I know I am able to do.

12. I rarely have a chance to use the teaching methods I think work best for me.

In other factor analyses these items were joined by additional ones to aid in the factor's interpretation, particularly Item 1 (shown in connection with the pace of work factor, above) and Item 8, referring to feelings about being tied down to the classroom. These two items

had loadings in the high 30's on Factor III, just below the cut-off point of .40 we used for the display in Table 8.

We have been struck in earlier work (Charters, 1973) by the salience of the press of time in the concerns of teachers and especially (as we reflect on it) by their inclination to consider the time shortage as a generic condition of teaching. It is possible that Factor III has singled out something close to a competence aspect of sense of autonomy--a variation among teachers concerning their personal mastery of the time dilemma, a variation in their feelings of being able to take the work of teaching in stride. If so, we would wish to exclude it as not fitting our conceptualization of sense of autonomy, but it would require considerable more investigation to establish this possible interpretation than we have undertaken to date.

Freedom from surveillance. Factor V in Table 8 is defined by a number of items reflecting the teacher's beliefs about the extent to which he or she is under surreptitious surveillance of administrators or fellow teachers and must guard his or her demeanor. When this factor appeared in our first factor analysis we had an urge to refer to the dimension as "paranoid suspiciousness" in recognition of the content of the negatively worded items. The items deal with beliefs that other teachers are out to criticize one's teaching (Item 24), that one has to guard against "doing or saying the wrong things" in teaching (Item 23) and has to "look busy" even when there is nothing to do (Item 7). On the positive side the items concern beliefs that the principal "trusts my judgment" in evaluating students (Item 19), "no one is peering

over my shoulder at the way I teach" (Item 21), and "I can say whatever I wish" in the classroom (Item 22).

Freedom to choose the techniques of work. This factor, appearing as VII in the present data, was considerably more prominent in earlier analyses than it is here. The two items that clearly define it are:

13. I feel free to try out new teaching ideas with my classes.

14. Generally speaking, I feel as though the teaching techniques I can use are closely controlled in this school.

One item we would expect to find substantially loaded on this factor was only modestly so, at the level of -.34, *viz.*, "I rarely have a chance to use the teaching methods I think work best for me."

Other factors. The two other factors in Table 8 that we have not discussed, Factors IV and VI, are not readily interpretable, nor do the prior factor analyses give firm clues about them. Factor IV might be seen as related to Blauner's "freedom of physical movement" in light of the loading of Item 8, "I am so tied down to the classroom that I would find it hard to take a short break . . . ," and the other two items regarding the constraints on spending free time (Items 6 and 7). Factor IV, incidentally, is the one factor showing consistently low correlations with the other six factors, most of which are essentially zero. (See Table 9.) The meaning of Factor VI is also obscure to us. Only Item 5, concerning the "uncomfortable influence of the cirriculum guide on what I teach", is uniquely associated with it.

Conclusion. Our explorations into the dimensionality of the sense of autonomy scale suggests that there may, indeed, be several distinctive components of which sense of autonomy is comprised. The five factors we have interpreted are freedom to determine student assessment criteria, control over the pace of work, freedom from work pressures, freedom from surveillance, and freedom to choose the techniques of work. Given these factors, additional items are more pointed ones, conceivably could be written so that each component could be measured separately.

The fact remains, however, that the five interpretable factors are substantially intercorrelated (r's from .13 to .41) and all of the 24 scale items seem to tap a single underlying attribute of teachers--their feelings of autonomy in the work of teaching.[4] As noted elsewhere in this appendix, this psychological disposition is independent of other phenomenological responses of teachers relevant to the MITT research.

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4. Once again, the ambiguous Item 11 must be called to attention. It played no role in helping to interpret the factors, loading .37 on the pace of work factor and negligibly on all others, and probably should be deleted from the scale.

APPENDIX D

Subjective Measures of the MITT Study

This appendix concerns the question of whether or not the several measures of subjective attributes of classroom teachers, data for which are obtained simultaneously through a single questionnaire form, can reasonably be regarded as indicators of independent constructs. Our approach has been to use procedures of factor analysis applied to item-level intercorrelations of scale responses. In this appendix we will concentrate for the most part on the variables central to the MITT investigation, disregarding a variety of other measures included in the questionnaires but peripheral to the prime study. A second part of the appendix reports our studies of the reliability of key measures.

Unlike analyses reported in the preceding appendix, our interest here is not in scale construction but in scale performance. The measures have been taken virtually intact from the previous investigations at Stanford (Meyer and Cohen, 1971) and Oregon (Pellegrin, 1970a, 1970b) and our intention is to use them as they stand in the interests of replication. The performance information should help to illuminate the relationships of variables we expect to examine in the course of the MITT Project. One specific issue we hope to clarify, if not resolve, through the present analyses concerns the choice between two measures of Sense of Collegial Power, one featuring the influences attributed to *teachers individually* and the other featuring influence attributed to *teacher groups*. (See Chap. III) Both were drawn from the Stanford investigation,

and our previous examinations of the data presented by Meyer and Cohen and, especially, Brunetti (1970) had raised the possibility in our minds that the two might lead to different findings.

The MITT Project staff began technical analyses of scale performance in the winter of 1974, using responses of teachers in nine elementary schools of Oregon and California to a trial form of the MITT questionnaire. Some 170 teachers provided useable responses at that time. Subsequently, the questionnaire was readministered to a subset of these teachers (approximately 35 of them), but the time lapse between test and retest--4-1/2 months--seems inappropriately long for estimates of scale stability relevant to MITT purposes. Results of the field trials afforded us sufficient confidence to employ the subjective scales without significant change in the first wave of data collection of the main study, and the technical analyses were repeated on responses of teachers in the full 40-school sample.

While an effort had been made to select schools for the field trial that would generally be representative of the schools eventually chosen for the main study of MITT, some potentially disturbing differences became apparent once schools of the main study had been identified. In particular, the field-trial schools purposefully included a number that were formally organized in multiunit form and in which team teaching ostensibly was occurring, while only a few of the main-study schools were of such a character at the first data point. Unlike the field-trial schools which were either suburban or central-city schools of

public school districts, the 40-school sample included some predominantly rural and small-town schools, six Roman Catholic parochial schools, and two dependent schools operated on a federal military base. Judging from mean scores of teachers on certain of the subjective scales, teachers in the two samples were unlike, undoubtedly reflecting some of these school differences. Field-trial teachers, for instance, attributed greater power to the collegial group and to individual teachers in their schools than those in the 40-school sample, and their job satisfaction scores were generally lower. For the most part though the score variances were not markedly different between the two samples, suggesting that our developmental work on reliability and factor structure of the field-trial data would generalize to teachers of the main study. Nevertheless, we sought to certify that such would be the case, and most of the analyses reported in this appendix were based on teacher responses to the first wave of data collection, spring 1974.

A. Independence of the Scales

An item-level factor analysis was performed on six subjective scales of the MITT Project whose main purpose, as mentioned above, was to determine the extent to which each set of scale items defined an independent underlying dimension in the factor structure. We were also interested in examining the comparative value of two possible measures of the concept sense of collegial power, insofar as a factor analysis could shed light on the question, and inspecting the overlap or distinctiveness of two measures of job satisfaction, one drawn from the Pellegrin study

and the other from the Stanford study. The six scales (totaling 53 items) were:

Sense of Collegial Power (Individual), Stanford source, 5 items.
Sense of Collegial Power (Group), Stanford source, 5 items.
Job-Career Satisfaction, Stanford source, 5 items.
Work Satisfaction, Pellegrin source, 10 items.
Professional Ambition, Stanford source, 4 items.
Sense of Autonomy in Work, MITT source, 24 items.

The Professional Ambition scale is not central to the main problem of the MITT study; it was included in the analysis for tangential reasons. The Sense of Autonomy scale is treated in detail in Appendix C, and only its separation from the other subjective measures is at stake here. We have reproduced the scale items for all but the Sense of Autonomy scale in Table 1 for ease of reference. Items for the Sense of Autonomy measure are given in Table 1 of Appendix C.

A principal axis factor analysis was performed on a 50 percent random sample of teachers in 40 schools of the first wave of data collection of the MITT main study. The R matrix was based on 310 responses. Fourteen factors whose roots exceeded 1.00 were extracted and rotated to an orthogonal solution, and factor plots were output by the computer program so that departures from orthogonality could be determined by visual scan.[1]

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[1]We used the FACTOR subprogram from Statistical Packages for the Social Sciences for the computations (Nie, *et al.*, 1975). Initial factor extraction was done by the principal factor method with iterated communalities (PA2.).

TABLE 1: Scales and Items in Factor Analysis

Scale and Item Number

SENSE OF COLLEGIAL POWER (Individual)*

"How much influence do individual teachers in this school have over . . ."

1 Determining the educational goals and objectives of the school.
2 Establishing school rules and regulations.
3 Student grading practices.
4 General curriculum planning.
5 Student control and discipline procedures.

SENSE OF COLLEGIAL POWER (Group)*

"How much influence do school committees, teams, or groups (e.g., same grade level, subject area) here in this school have over . . ."

[Identical items to the five above.]

JOB-CAREER SATISFACTION*

1 How satisfied are you with your present job?
2 How satisfied are you with teaching as an occupation?
3 If you were offered a good job outside of education at a good salary which did not involve much close contact with people, how likely would you be to accept?
4 If you were offered a good job outside of education at a good salary which would involve close contact with people, how likely would you be to accept?
5 If you were given the chance to go back to college days and start over, how likely would you be to choose teaching as a career?

WORK SATISFACTION*

"In your present teaching situation, to what extent . . ."

1 Do your teaching efforts indicate that you will be making progress toward the professional goals that you have set for yourself?

TABLE 1. (Continued)

2 Are the school and school district policies and regulations unfair?
3 Are your efforts and achievements recognized by others?
4 Are your personal relationships with administrators and supervisors unpleasant?
5 Do you have the authority to direct the work for which you are responsible?
6 Do administrators and supervisors show an inability or unwillingness to give you help when you need it?
7 Are you able to see positive results from your work efforts?
8 Are your personal relationships with fellow teachers unpleasant?
9 Does the work for which you are responsible indicate your career expectations are being realized?
10 Are pertinent instructional materials and aids unavailable?

PROFESSIONAL AMBITION

1 I would like more frequent opportunities to help young teachers develop classroom skills.
2 I could see myself helping to lead workshops on teaching techniques.
3 I would be very interested in showing other teachers styles and techniques I've learned and developed.
4 I should be involved in making supervisory evaluations of other teachers.

[Response alternatives to this scale are strongly agree, agree, moderately agree, moderately disagree, disagree, and strongly disagree. Weights assigned for scoring run from 6 for strongly agree to 1 for strongly disagree.]

SENSE OF WORK AUTONOMY

[The 24 items, response alternatives, and scoring procedures are reported in Appendix C.]

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*Response alternatives and scoring weights are reported in Chapter 1.

The rotated factor matrix is presented in Table 2, with factor loadings of less than .30 omitted to facilitate interpretation.[2] Three of the factors were either trivial or uninterpretable after rotation.

In general, the items of the scales separated cleanly into distinct factors. With one exception, the results indicated that each scale tapped an underlying attribute independent of the others. The group and individual versions of Sense of Collegial Power formed Factors 1 and 4 respectively, with no overlapping item loadings between them. Items of the Stanford measure of Job-Career Satisfaction and Professional Ambition formed Factors 3 and 5, while the Sense of Work Autonomy items distributed over six factors corresponding rather closely to the dimensionality of that scale as discussed in Appendix C.[3] Examination of the plots of factor loadings showed no noticeable trends away from orthogonality except among the factors representing the Sense of Autonomy dimensions, where obliqueness would be expected, and one other case mentioned below.

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[2]The unrotated matrix is available on request from the director of the MITT Project.

[3]While the constraint of orthogonality in the present analysis tends to cloud the dimensionality of the Sense of Autonomy scale, most of the components described in Appendix C are discernible in Table 2. Factor 2, the first extracted in the series, appears to be a general factor bringing together items from several dimensions of the scale. Beyond that, though, it is possible to recognize Pace of Work (Factor 6), Time Pressure (Factor 7), Student Assessment Criteria (Factor 10), and Techniques of Work (Factor 13).

TABLE 2: Factor Structure of Six Subjective Measures, Orthogonally Rotated, MITT Teachers, Spring 1974.*

N = 310

Scale and Item	Factor 1	2	3	4	5	6	7	8	9	10	11	12	13	14
SENSE OF COLLEGIAL POWER (Individual)														
1				.73										
2				.80										
3				.59						-.31				
4				.69										
5				.60								.32		
SENSE OF COLLEGIAL POWER (Group)														
1	.79													
2	.74													
3	.76													
4	.88													
5	.74													
JOB-CAREER SATISFACTION														
1			.37								.44			
2			.74								.30			
3			-.66											
4			-.52								-.37			
5			.68											
WORK SATISFACTION														
1											.58			
2											-.39			
3											.52			
4								.66						
5													.37	
6								.70						
7											.48			
8														.49
9											.60			
10											-.32			

TABLE 2. (Continued)

Scale and Item	Factor 1	2	3	4	5	6	7	8	9	10	11	12	13	14
PROFESSIONAL AMBITION														
1					.67									
2					.83									
3					.76									
4					.49									
SENSE OF AUTONOMY														
1						.74								
2						.80								
3							.63							
4		-.31				.43								
5							.41							
6							.32		.56					
7									.68					
8							.40		.39					
9							-.35							
10							.44				-.36			
11														
12		.36												
13		-.34											.56	
14													-.57	
15													.50	
16		.30		-.31										
17		.52												
18		.40								.35				
19		-.46								-.32			.38	
20										.58				
21		-.58												
22		-.47										.45		
23		.67									.30			
24		.51												.34

*Only factor loadings of .30 or greater are entered in the table. Based on a 50 percent sample of teachers.

The Pellegrin scale of Work Satisfaction was the exception to the clean separation of scales. The ten items of the scale had loadings distributed over several factors. While six of the items loaded on Factor 11, that factor also consisted of three items from the Job-Career Satisfaction measure. Two of the ten items (Items 4 and 6) formed a small factor of their own, which seemed to reference the ease of the teacher's relationships with administrators and supervisors. Comparison of Factors 3 and 11 indicates that the first focuses principally on satisfaction with the teaching *career* while the second centers on satisfaction with the *immediate work situation.* The one item in the Stanford scale that concerns the "present job" loads more heavily on Factor 11 than on 3. Interestingly, it is the "motivator" items of the Pellegrin scale rather than the "hygienic factors" that better define teacher satisfaction with the immediate work situation. (See Chapter I for this distinction.) In any event, if the Pellegrin scale is to be used intact in further work, its relative impurity and its interdependence with the Job-Career Satisfaction scale must be taken into account.

The independence of the individual teacher and teacher group versions of the Sense of Collegial Power measure indicated in Table 2 was surprising to us. Other analyses had suggested that the two versions were closely associated. Our early computations based on school scores for the various indexes of the Stanford investigation and the data available from that investigation (Brunetti, 1970, Appendix D) had yielded a rank-order correlation of .68 between the influence of individual teachers

and the influence of teacher groups on school affairs.[4] Further, a factor analysis performed on responses to the field-trial questionnaire of the MITT study, implicating the entire series of Stanford's "influence" scales (see Chapter I) as well as other measures of the MITT Project, had produced a single factor on which items of the individual teacher and teacher group scales had substantial and approximately equal loadings. That analysis had used oblique rotations. Whether the failure of Factors 1 and 4 to merge in the present analysis is due to sample differences, to the difference in the scale factored, or to the orthogonal rotation, we cannot say. Examination of the plot of item loadings suggests that the two factors are correlated to some degree but certainly not that they are one and the same. The issue deserves further investigation.

B. Reliability Estimates

Estimates of reliability of the key subjective scales of the Project were obtained in several ways, using responses from the field trial of the questionnaire and its administration in the first wave of data collection of the main study. Table 3 gives the internal consistency reliability estimate (Cronbach's α), sample means and standard deviations, and skewness coefficients for the two job satisfaction scales and the two versions of Sense of Collegial Power.[5]

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[4]The correlation was computed over 14 schools of the Stanford investigation. Results of our reanalyses of the Stanford data are reported in the MITT prospectus (Packard, 1973, pp. 58-64).

[5]The skewness coefficient is the one available in the SPSS subprogram CONDESCRIPTIVE, cited on p. 185 of the revised manual (Nie, *et al.*, 1975).

TABLE 3. Reliability and Distributions Characteristics of Four Subjective Measures, MITT Teachers, Spring 1974.

Scale, Number of Items, and Score Range	N	Mean	Standard Deviation	Skew	Reliability*
SENSE OF COLLEGIAL POWER (Individual) - 5 Items 1.0 - 5.0	592	3.22	.791	-.03	.885
SENSE OF COLLEGIAL POWER (Group) - 5 Items 1.0 - 5.0	587	3.13	.881	-.21	.896
JOB-CAREER SATISFACTION 5 Items 5.0 - 22.0	595	17.75	3.350	-.81	.796
WORK SATISFACTION 10 Items 1.0 - 4.0	564	3.26	.340	-.50	.750

*Coefficient *a*. See text.

Estimates for the Sense of Autonomy scale are reported in Appendix C. The reliability estimate was obtained by the formula,

$$\alpha = \frac{N_i}{N_i - 1}\left(1 - \frac{\sum s_i^2}{s_t^2}\right)$$

where N_i is the number of items in the scale, s_i^2 is the variance of individual items, and s_t^2 is the variance of total scale scores for the sample of respondents (Stanley, 1971, p. 424).

The table shows that the two measures of job satisfaction crowd the upper ends of their respective scale ranges, giving the score distributions a strong negative skew, more so for the Job-Career Satisfaction scale than the Work Satisfaction scale. The same was apparently true in the Stanford study (Meyer and Cohen, 1971, p. 50) and, of course, is a standard condition of measures of teacher job satisfaction. The Work Satisfaction measure has a lower reliability estimate than the Stanford scale, despite the fact that it contains twice the number of items. Neither is strongly reliable by this estimation procedure, but the marginality of the Work Satisfaction coefficient (.76) could be anticipated from the factor analysis of the preceding section.

Reliability coefficients for the alternative measures of Sense of Collegial Power are satisfactorily high and provide no substantial grounds for choosing between them. The mean scores, incidentally, can be viewed as indicating that the average teacher on the average item attributes "moderate" influence to individuals or groups of teachers in the school.

The MITT staff also carried out a two-facet analysis of scale reliability or "generalizability", following the procedures of Cronbach, *et al.* (1972), in which item and occasion (through-time stability) contributions to measurement error simultaneously could be estimated. The data were from a small subset of teachers who were administered the field trial questionnaire first in late November 1973 and again in mid-April 1974.

We argued in Appendix C that the 4-1/2 month interval between test and retest is too long for the type of subjective attributes under investigation in the MITT Project. Such attributes as job satisfaction or impressions of collegial power in the school are presumed to be relatively sensitive to situational conditions and, unlike personality dispositions or fundamental values, susceptible to periodic variation. Indeed, the hypotheses of the MITT study are predicated on that assumption. The attributes at stake are "temporary but general" rather than "lasting and general", in Thorndike's (1951) terminology, and our intuition suggests that the sense in which "temporary" should be taken is a span of time of no more than two or three months. Within that span--roughly an academic term--job satisfaction or impressions of collegial power are conceived to remain stable and observed score variations associated with the sampling of testing occasions would be indicative of measurement error, but variations over a longer span of time could just as well indicate true score variation as error.

Without reproducing the data, we can summarize the results

of the analysis with two observations. First, the error component for the person-by-occasion interaction was comparatively large for all of the scales except Work Satisfaction, indicating substantial through-time instability of the measure (or of true scores, as per above). Second, the person-by-item interaction component was relatively small for the scales, again except for Work Satisfaction, suggesting an inclination for teachers to respond to the items consistently at any given time. If the occasion facet is disregarded, the internal consistency coefficients approximate those shown in Table 3.

APPENDIX E

Companion Study Variable Measures

The following items were used to measure all of the general and most of the specific predictor variables in the companion study (Chapter IV). These items have been retyped and placed in a different format for purposes of exposition and except for their wording do not appear as they did in the various questionnaires. The items have been divided into two sections; the first group comes from questionnaires administered to teachers and the second comes from the corresponding principal questionnaire. Affixed to the items from the teacher questionnaire are alpha-numeric code numbers that correspond to those listed in the discussion of the predictor families in Chapter V. To the right of each code number have been added two additional codes. In the first position, the number 1 means the item was administered to one-half of the school's faculty. The number 2 signifies the item was administered to all teachers in a school. In the second position the numbers 1 and 2 refer respectively to data taken from the spring and fall administration of instruments. There is no corresponding code for items from the principal questionnaire.

Because of their wide-spread use and easy access, the Halpin OCDQ and the Wehling and Charters "conceptions" measures have not been included here.

Items from the Teacher

Questionnaire

PERSONAL DATA FORM

1. Your Name .....

2. Name of Your School .....

3. Sex: ( ) Male ( ) Female

4. Age: ( ) 20 - 24 years
( ) 25 - 29 years
( ) 30 - 34 years
( ) 35 - 39 years
( ) 40 - 44 years
( ) 45 - 49 years
( ) 50 - 54 years
( ) 55 - 59 years
( ) 60 - 64 years
( ) 65 - 69 years

5. Please write below the position-title that applies to your employment in your school. If you have more than one position-title, write them all. After each title, put the approximate percentage of full time that your work under that title requires.

.....percent

.....percent

.....percent

6. Experience in present position at this school (at end of school year.)

.....years in present position

7. Experience as an educator (at the end of this school year)

.....years as a teacher

.....years as a principal or other building administrator

.....years other (please specify position) .....

.....years other (please specify position) .....

.....years other (please specify position) .....

.....years other (please specify position) .....

8. Amount of education (check one)

( ) Less than a bachelor's degree
( ) Bachelor's degree
( ) Bachelor's plus additional credits
( ) Master's degree
( ) Master's degree plus additional credits
( ) Doctor's degree

The following questions are focused on the process of adopting an educational innovation. In many questions we refer to a particular innovation called IGE/MUSE, which employs teaching teams. Your school may not be an IGE/MUSE school. If not, simply answer the questions by substituting teaching teams or units for the term IGE/MUSE.

1. **Concerning the opinions of teachers and administrators in this school, which of the following best characterizes their feelings?**

Regarding the decision to install IGE/MUSE in this school . . .

a. The Principal PR011 2 1

_____ supports the decision
_____ is indifferent to the decision
_____ is opposed to the decision

b. Teachers in general

support the decision PR012 2 1
are indifferent to the decision
oppose the decision

c. Teachers like myself

_____ support the decision (Omitted for analysis)
_____ are indifferent to the decision
_____ oppose the decision

d. I, personally,

_____ support the decision PR014 2 1
_____ am indifferent to the decision
_____ oppose the decision

2. Which best characterizes the chances that, if they wished, teachers in this school could prevent IGE/MUSE from being installed?

a. Right now our chances are:

..... very good
..... good
..... about even
..... bad
..... very bad

PR021 1 1

b. A year from now, I predict our chances will be:

..... very good
..... good
..... about even
..... bad
..... very bad

PR022 1 1

c. To the best of your knowledge, has there been designated a formal opportunity at which time teachers can officially determine whether the IGE/MUSE Project should be discontinued in this school?

..... yes ..... no

PR023 1 1

If yes, can you tell us when and under what conditions teachers will make this determination? .....

.....

3a. Which of the following best describes the manner in which you became involved in the IGE/MUSE project in this school?

PR 030 1 1

..... I am not involved in the project

..... I didn't have much choice. If I weren't involved in the project it would mean I would have to leave teaching or find a job in another school.

..... I really wanted to become involved in the project. Other possibilities seemed much less exciting or important to me.

3b. Which of the following best describes your present involvement in the IGE/MUSE project in this school?

PR041 1 1

..... I am not involved in the project
..... I am fairly involved in the project
..... I am substantially involved in the project
..... I am extremely involved in the project.

Part 11

3c. **Which of the following best describes your plans for future involvement in the IGE/MUSE project in this school?**

PR042 1 1

..... I plan to become more involved in the project

..... I plan to keep my involvement at its present level

..... I plan to become less involved in the project

This section is concerned with the benefits of an educational innovation. As before, if yours is not an IGE/MUSE school simply substitute the terms teaching teams or units in answering the questions.

1a. Please rank the following educational goals in order of the importance they should hold for teachers in this school. The most important goal should be ranked "1" and the least important goal should be ranked "11." Please use all the ranks from "1" to "11."

PR050 1 1

.... a. solving the personal problems of individual students

.... b. encouraging creativity among students

c. maintaining an orderly and quiet classroom

.... d. enriching the course of study

.... e. giving individual attention to students

.... f. diagnosing learning problems of students

g. coordinating classroom activities with other parts of the school program

h. ensuring students learn basic skills

i. developing student ability in analytic reasoning

j. developing the aesthetic potential of students

k. collaborating among teachers to implement the instructional program.

1b. Using the corresponding letters note which, if any, goals from the above list you believe will be enhanced by the IGE/MUSE project in this school. .....

PR060 1 1

1c. Using the corresponding letters note which, if any, goals from the above list you believe will be more difficult to achieve because of the IGE/MUSE project in this school. .....

PR070 11

In this section we are interested in how becoming a team member might affect changes in the role of teacher. If you are already a member of a teaching team answer each question on the basis of your experience.

1. **becoming a team member will:**	..... have little effect on my role as a teacher	..... have noticeable effect on my role as a teacher	..... have enormous effect on my role as a teacher

PR111 2 1

2. **When considering the effect of becoming member of a team will have on my role as a teacher, I am sure:**	..... I will be able to make the required changes with ease	..... I will be able to make the required changes, but with some difficulty	..... I will not be able to make the required changes

PR112 2 1

Please indicate your relative preference for working with adults (e.g., other teachers, aides) in addition to working with children. (Choose one).

1. **"Although I work primarily with children . . ."**

..... I enjoy working with adults *even more.*

..... I enjoy working with adults *just as much.*

..... I *don't* enjoy working with adults as much. PR113 2 1

The following questions are focused on the process of adopting an educational innovation. In many questions we refer to a particular innovation called IGE/MUSE, which employs teaching teams. Your school may not be an IGE/MUSE school. If not, simply answer the questions by substituting teaching teams or units for the term IGE/MUSE.

1. **Which of the following best describes who made the decision to install IGE/MUSE in this school.**

The decision was made exclusively by teachers in this school. PR130 1 1

The decision was made by teachers in this school and approved by others, perhaps the administration and the school board.

The decision was made by others, perhaps the administration and the school board, and approved by teachers in this school.

The decision was made exclusively by others, perhaps the administration and the school board. Teachers in this school were not involved in making the decision.

2. **Generally speaking which of the following best describes the way in which teachers in this school participated in the events leading to the decision to install IGE/MUSE in this school?**

Teachers in this school did not participate. PR141 1 1

Teachers in this school were only asked to give their opinions regarding whether IGE/MUSE should be installed in this school.

Teachers in this school took a formal vote to determine whether IGE/MUSE should be installed in this school.

Teachers in this school reached consensus that IGE/MUSE should be installed in this building.

3a. **How well do you feel the attitudes and opinions of teachers in this school were considered regarding the decision to install IGE/MUSE in this school.**

The attitudes and opinions of the staff were . . .

carefully considered PR142 1 1

generally acknowledged

completely overlooked

3b. **To what extent do you feel your attitudes and opinions were considered regarding the decision to install IGE/MUSE in this school.**

My attitudes and opinions were . . .

_____ carefully considered

_____ generally acknowledged PR143 1 1

_____ completely overlooked

4a. **For the most part how satisfied are teachers in this school with their participation in the events leading up to the decision to install IGE/MUSE in this school?**

_____ very satisfied

_____ satisfied

_____ partly satisfied, partly dissatisfied PR131 1 1

_____ dissatisfied

_____ very dissatisfied

4b. **For the most part, how satisfied are you regarding your own participation in the events leading up to the decision to install IGE/MUSE in this school?**

_____ very satisfied

_____ satisfied

_____ partly satisfied, partly dissatisfied

_____ dissatisfied PR152 1 1

_____ very dissatisfied

5. **Concerning the opinions of people who matter but who are not employed at this school, which of the following characterizes their feelings?**

They support the decision to install IGE/MUSE in this school.

They are indifferent about the decision to install IGE/MUSE in this school.

They oppose the decision to install IGE/MUSE in this school.

PR160

In the appropriate places write the name and position of each person who, to the best of your knowledge, has had experience in a school that had teams of teachers. Also indicate what you believe to be the ATTITUDE of each about teaming and his or her RELATIVE INFLUENCE in this school. Include yourself, other teachers, administrators, student teachers, specialists and paraprofessionals.

1. Names of Persons in this School with Team Teaching Experience	Present Position in this School	Attitude About Teaming			Relative Influence in this School		
		opposed	indif-ferent	support	little or no	moder-ate	sub-stantial
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
PR310 2 1		1	2	3	1	2	3
PR320 2 1		1	2	3	1	2	3
PR330 2 1		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3
		1	2	3	1	2	3

This section is concerned with the benefits of an educational innovation. As before, if yours is not an IGE/MUSE school simply substitute the terms teaching teams or units in answering the questions.

1a. Please indicate how much additional benefit you believe will accrue to students in this school due to the installation of IGE/MUSE.

I foresee

..... Little or no additional benefit for students

..... Moderate additional benefit for students PR171 11

..... Substantial additional benefit for students

1b. Please indicate how much additional benefit you believe will accrue to teachers in this school due to the installation of IGE/MUSE.

..... Little or no additional benefit for teachers

..... Moderate additional benefit for teachers PR172 1 1

..... Substantial additional benefit for teachers

1c. In your opinion will the additional benefit of IGE/MUSE outweigh the cost of installation?

..... Yes, it is clearly worth the cost

..... I don't know, it is more or less worth the cost

..... No, it is clearly not worth the cost. PR173 1 1

In this section we are interested in identifying influential persons in your school. Please read the questions carefully, then write in the name and position of the most influential persons under each.

1. If you wanted to receive approval from the faculty of your school for an idea you were proposing, it would sometimes be helpful to enlist the support of certain other individuals in your school. Please list below, by name and position, the individuals whose support, for your ideas, would help most in obtaining faculty approval.

NAME PR650 2 1 POSITION

2. In any school faculty, some individuals generally make suggestions for the solution of problems that are more useful and reasonable than are suggestions made by other individuals. Please list below, by name and position, those individuals in your school whose suggestions you would *expect* to be most useful in solving school problems.

NAME POSITION

PR660 2 1

2. **If you are a member of a team or unit, does your team have an official leader?**

PR670 2 2

Yes, my team has an official leader.

No, my team does not have official leader.

I am not a member of a team or unit.

If your team has a leader, how was the leader chosen?

Leader was chosen by the principal.

Leader was chosen by the team members.

Leader was chosen by the principal and team members.

Other (please specify).....

Not applicable (not a team member, or team has no official leader).

PR710 2 2

1. **Below are a number of proposals for appraising classroom teaching that come up from time to time. Please indicate with a check how much you would approve or disapprove of each if it were suggested in your school.**

How much would you approve or disapprove of these proposals?	Approve highly	Approve quite a lot	Approve somewhat	Approve only slightly	Don't care one way or the other	Disapprove only slightly	Disapprove somewhat	Disapprove quite a lot	Disapprove highly
Pupil evaluations of teachers would be collected in each classroom. (A non-verbal form would be used in the primary grades.) The evaluations would be submitted to the building principal.									
A team of experts from outside the school district would appraise teaching in every elementary classroom. Their report, circulated to building principals and staffs, would not identify individual teachers or classrooms.									
Video tapes would be made in each classroom during the year. A district-wide committee of elementary teachers and supervisors would view the tapes and rate each teacher. Their ratings would be filed in the superintendent's office, with copies given to individual teachers.									
A committee of three teachers would be elected by the school faculty to evaluate teachers in the building. They would return their evaluations only to the individual teachers.									
A standardized achievement test would be given to pupils at the beginning and end of the school year. Average improvement scores for each home room would be prominently posted in the school.									
A committee from the Parents' Association would assess teaching in each classroom. Insofar as possible, the committee would consist of parents with teaching experience. The committee would share its assessments with the principal and school staff.									

PR720 2 2

2. **The following situations commonly arise in schools. Please indicate with a check how much you would approve or disapprove of the behavior of the individuals described in each situation.**

How much would you approve or disapprove of . . .	Approve highly	Approve quite a lot	Approve somewhat	Approve only slightly	Don't care one way or the other	Disapprove only slightly	Disapprove somewhat	Disapprove quite a lot	Disapprove highly
a teacher who insists that your class join hers in viewing an ecology film.									
a principal who privately reprimands a teacher for giving an unusually large number of low marks on report cards.									
a teacher who goes into detail, when talking to parents, about how other teachers in the school discipline students.									
a principal who refuses to take action on the behalf of parents when they complain about a strict teacher.									
an experienced teacher who insistently advises younger teachers on better ways of reaching the slow learner.									
a principal who exactly specifies the conduct rules each teacher should set up in his own classroom.									
a teacher who chooses not to use a new reading approach that other teachers in the school have adopted.									

Please answer the following questions regarding certain informational details about your school.

1. **Below list all of the edcational innovations that are presently underway in this school. Indicate also how many teachers are involved in each project.**

Name of Innovative Project	Number of Teachers Involved

2. **Below list the names of consultants (e.g., university, state and county personnel) that have been in contact with you and your staff in the last four months to assist with any of the innovative projects listed above.**

Name of Consultant	Name of Agency	Name of Innovative Project	Number of Contacts

3. **What per cent of the teaching staff of this school is expected to supervise the lunchroom on a regular basis?**

.....75-100% 25-50%

.....50-75% .....less than 25%

.....none

4. **What per cent of the teaching staff of this school is expected to supervise the playground on a regular basis?**

..... 75-100% 25-50%

..... 50-75% ..... less than 25%

..... none

5. **How many volunteers (parents and others) regularly assist with the school's instructional program each week?**

..... 30 or more 10-19

..... 20-29 1- 9

..... 0

6. **Considering all of the paid paraprofessional employees (part or full time) who assist teachers in your school, how many perform duties which are**

..... primarily clerical?

..... primarily working with children?

..... other? please specify .....

7. **Approximately how many students are enrolled in your school by grade?**

Kindergarten.....	Third grade.....	Sixth grade.....
First grade.....	Fourth grade.....	Seventh grade.....
Second grade.....	Fifth grade.....	Eighth grade.....

Special programs or classes (not counted above):

..... (Type of program)	..... Enrollment
..... (Type of program)	..... Enrollment
..... (Type of program)	..... Enrollment

Items from the Principal

Questionnaire

PRINCIPAL QUESTIONNAIRE

If no teachers are currently assigned to formally designated teaching teams, check below and skip the remainder of Part 4.

( ) No teaching teams have been formally established this year.

( ) Teaching teams were formally established earlier this year, but they have now been disbanded.

For Schools With At Least One Formally Designated Team

1. **What is the name of each formally designated team, the number of regular classroom teachers assigned to the team, and the name of the team leader? (If the team has no official leader, write in "none.")**

Team Name	Number of Teachers	Leader

2. **Please put a star (*) by the name of any team above that is comprised ENTIRELY of specialists.**

3. **Please list the names of any full-time regular classroom teachers who have not been assigned to a teaching team.**

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

4. **In general, how were team leaders chosen?**

( ) by the principal

( ) by the team members

( ) by the principal and team members jointly

( ) other. (please specify) _____

_____

_____

( ) No official team leaders.

5. **Do team leaders receive extra pay?**

( ) Yes. Approximately how much? _____

( ) No.

( ) No official team leaders.

6. **Do team leaders have more released time than other teachers?**

( ) Yes. Approximately how much per week? _____

( ) No.

( ) No official team leaders.

7. **When students are assigned to a team, are they assigned to an individual team member or are they assigned to the team as a whole?**

( ) Students are assigned to individual team members

( ) Students are assigned to the team as a whole.

8. On the average, how often are teams holding regular team meetings this term?

( ) Once or twice a week

( ) Once or twice a month

( ) Once or twice this term

( ) They do not meet regularly

9. Can team meetings be held regularly during an uninterrupted block of time?

( ) Yes. Please specify when.

( ) During the regular school day

( ) Outside of the regular school day

( ) No.

10. Does your school have a faculty cabinet (sometimes referred to as an IIC) which is comprised of the principal and team leaders?

( ) Yes. On the average, how often does the cabinet meet regularly this term?

( ) once or twice a week

( ) once or twice a month

( ) once or twice this term

( ) It does not meet regularly

( ) No.

11. Please list below any formal activities in which teachers were engaged during this school year that were designed to assist them in implementing the team approach.

Activity	Number of Days	Number of Participants (from this school)	Individual(s) Who Conducted Activity

12. Is your school currently adopting an IGE/MUS-E approach to instruction? ( ) Yes ( ) No

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